

ISSN 2521-4012

臺灣研蟲誌

Taiwanese Journal of Entomological Studies



第八卷，第三期

臺灣昆蟲同好會

Taiwanese Society of Insect Natural History

Vo. 8, No. 3, September 25, 2023

目錄 CONTENTS

[研究論文 Research Article]

艾斯、理查德·G·羅賓斯 姊妹盾臉姬蜂寄生於蝙蝠（哺乳綱：翼手目）的軟蜱（真蜱目：軟蜱科）之菲律賓新地理紀錄

ACE KEVIN S. AMARGA, RICHARD G. ROBBINS New Geographic Records of Soft Ticks (Ixodida: Argasidae) Parasitic on Bats (Mammalia: Chiroptera) from the Philippines.....51–56

艾斯、傑瑞米亞 S 阿瑪加 菲律賓巴坦島蝙蝠寄生蠅（雙翅目：蠅蠅總科）的首次紀錄
ACE KEVIN S. AMARGA, JEREMIAH S. AMARGA First Record of Bat Flies (Diptera: Hippoboscoidea) on Batan Island, Southern Luzon, Philippines.....57–60

劉興哲、陳賜隆、唐欣潔、馬承漢、李宜龍、胡芳碩、何彬宏、林翰羽、周昭蕊 阿里磅生態農場水棲昆蟲相調查

HSING-CHE LIU, SZU-LUNG CHEN, HSIN-CHIEH TANG, CHENG-HAN MA, I-LUNG LEE, FANG-SHUO HU, BIN-HONG HO, HAN-YUU LIN, CHAO-JUI CHOU Survey of Aquatic Insects Fauna in Alibang Eco-Farm, Taiwan.....61–69

劉興哲、賀毓翔、鄭欣如、雅羅斯拉夫·斯塔斯尼 馬祖列島的水棲肉食亞目和牙蟲科註記（昆蟲綱：鞘翅目）與暗紋扁形豆龍蝨首次記錄於臺灣

HSING-CHE LIU¹, YU-HSIANG HO, HSIN-JU CHENG, JAROSLAV ŠŤASTNÝ Notes on Hydradephaga and Hydrophilidae (Insecta: Coleoptera) of the Matsu Islands, including a New Record of *Platynectes dissimilis* (Sharp, 1873) from Taiwan.....70–75

[科學短訊 Scientific Communication]

艾斯、雷尼爾·馬納洛 *Cyclopodia horsfieldi* de Meijere, 1899（雙翅目：蠅蠅科）之菲律賓新地理紀錄

ACE KEVIN S. AMARGA, RAINIER MANALO New Geographic Records of the Flying Fox Bat Fly *Cyclopodia horsfieldi* de Meijere, 1899 (Diptera: Hippoboscoidea) from the Philippines.....76–77

曾偉哲、鄭任鈞 臺灣產霍氏大眼象鼻蟲之正式紀錄（象鼻蟲科：大眼象鼻蟲亞科）

WEI-ZHE TSENG, REN-CHUNG CHENG Formal Record of *Mecopus hopei* Rosenschöld, 1838 (Curculionidae: Conoderinae) in Taiwan.....78–79

胡芳碩 大華蜻蜓（蜻蜓目：蜻蜓科）來自西太平洋上的紀錄

FANG-SHUO HU Record of *Tramea virginia* (Rambur, 1842) (Odonata: Libellulidae) from the West Pacific Ocean.....80–81

艾斯、林宗翰 臺灣本島首次記錄南蛇花蜱（硬蜱科：花蜱亞科）寄生於斯文豪氏攀蜥（飛蜥科：飛蜥亞科）

ACE KEVIN S. AMARGA, TZONG-HAN LIN First Record of *Amblyomma helvolum* Koch (Ixodidae: Amblyomminae) Parasitism on *Diploderma swinhonis* (Günther) (Agamidae: Draconinae) on the Main Island of Taiwan.....82–83

New Geographic Records of Soft Ticks (Ixodida: Argasidae) Parasitic on Bats (Mammalia: Chiroptera) from the Philippines

ACE KEVIN S. AMARGA^{1, 2, 3}, RICHARD G. ROBBINS^{4, 5, 6}

¹Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan. Email: ace_amarga061@yahoo.com

²School of Life Science, National Taiwan Normal University- Gongguan Campus, Wenshan District, Taipei 11677, Taiwan

³International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group

⁴Walter Reed Biosystematics Unit, Smithsonian Institution, Museum Support Center, Suitland, Maryland 20746, U.S.A.

⁵One Health Branch, Walter Reed Army Institute of Research, Silver Spring, Maryland 20910, U.S.A.

⁶Department of Entomology, Smithsonian Institution, National Museum of Natural History, Washington, DC 20560, U.S.A.

Abstract: The Argasidae (soft ticks) is a family of medically important blood-feeding arachnids that parasitize terrestrial vertebrates. In this paper, we present additional geographic records of bat-associated soft ticks belonging to the genera *Argas* Latreille and *Ornithodoros* Koch collected in the Philippines. These records include the first report of *Argas pusillus* Kohls from Balabac Island and the initial findings of *Ornithodoros batuensis* Hirst from Batan, Bohol, and Panay Islands. These discoveries enhance our understanding of the distribution of these tick species in the Philippines, which is relevant for assessing their potential impact on public health.

Keywords: Argasidae, ectoparasites, Philippines, Pteropodidae, Vespertilionidae.

Introduction

The family Argasidae, also known as soft ticks, is one of three extant tick families primarily characterized by the absence of a sclerotized scutum. Instead, they have a leathery and wrinkled cuticle, which is why they are commonly referred to as 'soft ticks.' Unlike hard ticks (family Ixodidae), which exhibit prominent sexual dimorphism, soft ticks lack such a feature, and distinguishing between adult males and females is possible only by examining the genital aperture. In males, the anterior margin of the aperture is more highly chitinized, resembling a human thumbnail, while in females, both margins are equally but lightly chitinized, resembling a pair of human lips (Nadolny et al. 2021). Late-stage nymphs may possess a pregenital pore, and the gnathosoma of argasid ticks is not visible in adults when viewed dorsally. This group currently comprises more than 190 species belonging to an indeterminate number of genera, although this report recognizes the five genera accepted by Guglielmone et al. (2010).

Argasid ticks parasitize reptiles, birds, and mammals, especially those that burrow, roost, or live in colonies (Diehl et al., 1982; Vial, 2009). Many argasid ticks can serve as reservoirs, amplifiers, or vectors of a broad range of pathogenic agents, including viruses, rickettsiae, borreliae, protozoans, and microfilariae (Hoogstraal, 1985; Lopez et al., 2016) or can cause allergic reactions resulting in skin lesions (Buczek et al., 2018). Accordingly, many argasid species are specific parasites of bats, including species belonging to the genera *Antricola* Cooley and Kohls, *Argas* Latreille, *Nothoaspis* Keirans and Clifford (presumably), as well as *Ornithodoros* Koch. As endophilic species, argasid ticks parasitizing bats typically inhabit crevices within the roosting sites of their hosts. Bat-associated argasid ticks exhibit a wide range of host preferences, with some feeding on multiple genera of bats (Sándor et al., 2021). Unlike other bat ectoparasites, such as bat flies (Nycteribiidae and Streblidae), relatively few reports have documented the bat-associated argasid ticks of the Philippines, although significant contributions have been made by Kohls (1950), Wilson (1970), Klompen et al. (1995), and Amarga et al. (2017). In this paper, we present new geographic records for the bat argasids *Argas pusillus* Kohls and *Ornithodoros batuensis* Hirst in the Philippines and provide an overview of the distribution of the two species across their respective ranges.

Material and Methods

Bats were collected using mist netting, and ticks were carefully removed with fine-tipped forceps and preserved in 95% ethanol prior to identification. Specimens were examined and photographed under a Leica S9D dissecting microscope and identified to species based on the morphological descriptions of Kohls (1950) and Dumbleton (1958). Host species names were determined according to Burgin et al. (2020), and argasid species names were obtained from the list provided by Guglielmone et al. (2010).

Results and Discussion

稿件收到 Received: 29 April 2023

稿件接受 Accepted: 24 July 2023

稿件出版 Published: 25 September 2023

Superorder Parasitiformes Reuter, 1909
Order Ixodida Leach, 1815
Family Argasidae Koch, 1844
Subfamily Argasinae Koch, 1844
Genus *Argas* Latreille, 1795

***Argas pusillus* Kohls, 1950
(Fig. 1A–B)**

Argas pusillus Kohls, 1950: 1. Repository: ♂ holotype in Field Museum of Natural History, Chicago, Illinois. Type locality: Philippines (Palawan). Type host: unspecified bat.

Material examined: PHILIPPINES: Balabac Island: on *Scotophilus kuhlii* Leach (Fig. 2): 6 larvae, X.2019, coll. J. Cantil.

Philippine records: Balabac (new island record), Cuyo, Luzon, Mindanao and Palawan (Kohls 1950, Parrish 1971; **this study**).

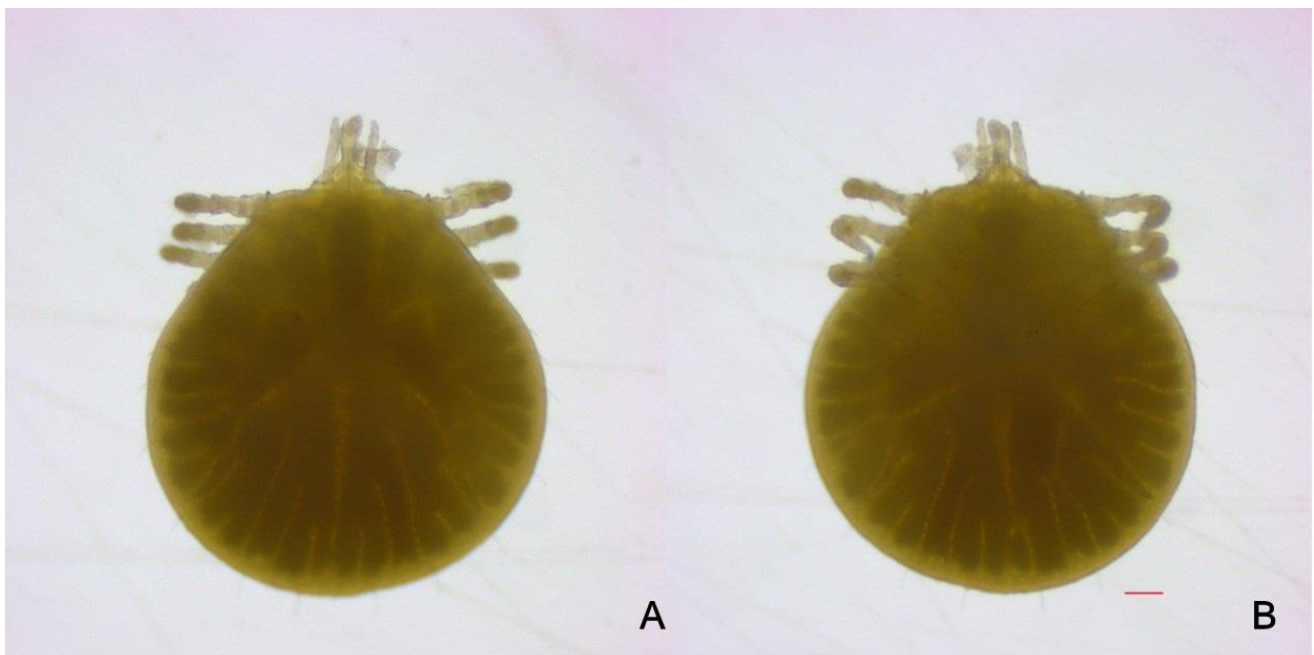


Figure 1. Dorsal (A) and ventral (B) views of an *Argas pusillus* larva collected from Balabac Island, Philippines. Scale bar = 100 μm .

Argas pusillus is one of two bat-associated soft ticks belonging to the genus *Argas* that have been recorded in the Philippines, with the other being *A. vespertilionis* (Latreille). Kohls (1950) described *A. pusillus* as a new species based on a male holotype specimen collected from an unknown bat host in the municipality of Brooke's Point on Palawan Island. This species is widespread in the Oriental faunal region, extending northward to the Palearctic region and southward to the Australasian region (Camicas et al., 1998; Petney et al., 2019). It has been documented in several Asian countries, including Malaysia (Audy et al., 1960), Singapore (Leong et al., 2010; Kwak, 2018), Taiwan (Robbins, 2005), Thailand (Uchikawa & Kobayashi, 1978), and the Philippines (Kohls, 1950). In the Philippines, *A. pusillus* was previously recorded from the following islands: Cuyo, Luzon, Mindanao, and Palawan (Kohls, 1950; Parrish, 1971). In this paper, we present the first record of *A. pusillus* from Balabac Island, which is the southernmost island of Palawan Province. The specimens were collected from an adult Lesser Asiatic Yellow Bat (*Scotophilus kuhlii* Leach), an insectivorous species that is widespread in South and Southeast Asia, including southern parts of China and Taiwan (Srinivasulu & Srinivasulu, 2019). The primary hosts of *A. pusillus* are insectivorous bats in the family Vespertilionidae, especially members of the genera *Scotophilus* Leach and *Pipistrellus* Kaup. Thus, collections of this species from other bat groups, such as flying foxes (family Pteropodidae) and birds (see the account of Parrish, 1971), can be considered instances of facultative or accidental parasitism.



Figure 2. *Scotophilus kuhlii* (Vespertilionidae), one of the hosts of *Argas pusillus* across its geographic range.

Subfamily Ornithodorinae Pospelova-Shtrom, 1946

Genus *Ornithodoros* Koch, 1844

***Ornithodoros batuensis* Hirst, 1929**

(Figs 3–4)

Ornithodoros batuensis Hirst, 1929: 365. Repository: unspecified. Type locality: Malaysia (Selangor). Type host: unspecified.

Material examined: **PHILIPPINES:** **Batan Island:** on *Eonycteris spelaea* (Dobson) (Fig. 5): 3 larvae, Baranggay Lagundi (13.223052N, 124.004372E), Rapu-Rapu municipality, Albay Province, XII.2015, coll. A.K. Amarga & R. Ante. **Bohol Island:** on *Rousettus amplexicaudatus* (E. Geoffroy): 1 larva, Baranggay Tawid (9.822839N, 124.531224E), Candijay municipality, 14.I.2012, coll. K.L. Phelps; on *E. spelaea*: 1 larva, Baranggay Santo Tomas (10.054870N, 124.314673E), Trinidad municipality, 26.II.2012, coll. K.L. Phelps; on *E. spelaea*: 6 larvae Baranggay Tawid (9.822839N, 124.531224E), Candijay municipality, 14.I.2012, coll. K.L. Phelps. **Panay Island:** on *R. amplexicaudatus*: 10 larvae, Baranggay Jayobo (11.102763N, 122.408952E), Lambunao municipality, Iloilo Province, 6–12.III.2017, coll. A.K. Amarga.

Philippine records: Batan (new island record), Bohol (new island record), Luzon, Marinduque, Mindanao, Negros, Panay (new island record) and Samal (Kohls 1950, Parrish 1971, Klompen et al. 1995, Amarga et al. 2017; **this study**).

Ornithodoros batuensis was first described based on a male and a nymph collected in the Batu Caves of Selangor, a state situated on the west coast of Peninsular Malaysia (Hirst, 1929). This species is widespread across Southeast Asia, extending into the Australasian region (Petney et al., 2019; Kazim et al., 2021). It has been recorded in the following countries: Indonesia (Durden et al., 2008), Malaysia (Hirst, 1929; Dumbleton, 1958; Klompen et al., 1995), Papua New Guinea (Klompen et al., 1995), Philippines (Kohls, 1950; Parrish, 1971; Amarga et al., 2017), and Thailand (Uchikawa & Kobayashi, 1978; Klompen et al., 1995). In the Philippines, *O. batuensis* has been recorded on the following islands: Luzon (Parrish, 1971), Marinduque (Amarga et al., 2017), Mindanao (Kohls, 1950), Negros (Klompen et al., 1995), Samal (Kohls, 1950), and Sibuyan (Klompen et al., 1995). Additionally, our records of *O. batuensis* on Batan (Albay Province), Bohol, and Panay are the first for these islands. These findings imply that *O. batuensis* is widespread across the Philippine archipelago, and we expect that this species will be found on other islands, including Cebu, Leyte, Mindoro, Palawan, Samar, and Siquijor. *Ornithodoros batuensis* primarily parasitizes Pteropodidae (Amarga et al., 2017), especially species belonging to the genera *Eonycteris* Dobson (dawn bats) and *Rousettus* Gray (rousette bats) (Klompen et al., 1995). In caves containing mixed colonies of *Eonycteris* and *Rousettus*, *O. batuensis* has been collected together with the streblid bat fly *Megastrebla parvior* (Maa) and the fruit bat ischnopsyllid flea *Thaumapsylla breviceps* Rothschild (Amarga et al., 2017).

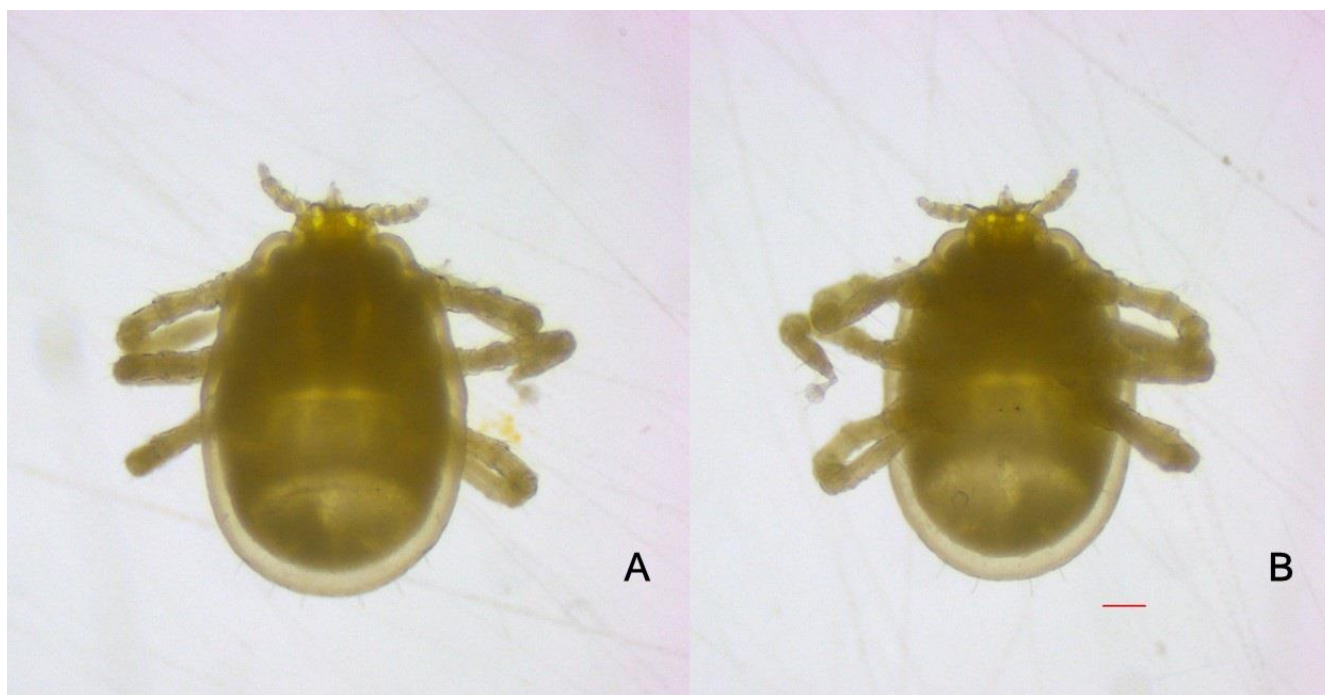


Figure 3. Dorsal (A) and ventral (B) views of an *Ornithodoros batuensis* unfed larva collected on Bohol Island, Philippines. Scale bar = 100 μ m.



Figure 4. *Ornithodoros batuensis* larvae on the lower back of *Rousettus amplexicaudatus* from Iloilo, Panay Island.



Figure 5. *Eonycteris spelaea* (The Lesser Dawn Bat), the primary host species of *Ornithodoros batuensis* in the Philippines.

Acknowledgments

The authors would like to thank the following: the Department of Environment & Natural Resources (DENR) and the Palawan Center for Sustainable Development (PCSD) for providing a collection permit and field assistance; Dr. K.L. Phelps (Texas Tech University, USA) and J. Cantil for donating specimens from Bohol and Balabac to the first author; Dr. J. Araquil (Western Visayas State University) for accommodations while working in Iloilo; and the following colleagues who assisted in the field: R.A. Ruzol, D.A.P. Fernandez, C.E. Supsup, A.A. Asis, J. Cantil, and U. Carestia.

All material in this paper has been reviewed by the Walter Reed Army Institute of Research. There is no objection to its presentation and/or publication. The opinions or assertions contained herein are the private views of the authors and do not necessarily reflect the official views of the U.S. Department of the Army or the Department of Defense.

References

- Amarga, A. K. S., Alviola, P. A., Lit, I. & Yap, S. A. 2017. Checklist of ectoparasitic arthropods among cave-dwelling bats from Marinduque Island, Philippines. *Check List* 13(1): 2029.
- Audy, J. R., Nadchatram, M. & Boo-Liat L. 1960. Malaysian parasites XLIX. Host distribution of Malayan ticks (Ixodoidea). *Studies from the Institute for Medical Research, Federation of Malaya* 29: 225–246.
- Buczek, A., Bartosik, K., Kulina, D., Raszewska-Famielec, M. & Borzęcki, A. 2018. Skin lesions in humans bitten by European pigeon tick *Argas reflexus* (Fab.) (Ixodida: Argasidae) massively occurring in the Upper Silesian conurbation of south-west Poland. *Annals of Agricultural and Environmental Medicine* 25 (2): 234–240.
- Burgin, C. J., Wilson, D. E., Mittermeier, R. A., Rylands, A. B., Lacher, T. E. & Sechrest, W. 2020. Illustrated Checklist of the Mammals of the World. Volume 2: Eulipotyphla to Carnivora. Lynx Edicions, Barcelona.
- Camicas, J. L., Hervy, J. P., Adam, F. & Morel, P. C. 1998. Les tiques du monde. Nomenclature, stades décrits, hôtes, répartition (Acarida, Ixodida). Orstom, Paris, 233 pp.
- Diehl, P. A., Aeschlimann, A. & Obenchain, F. D. 1982. Chapter 9- Tick Reproduction: Oogenesis and Oviposition. In: Obenchain, F.D. & Galun, R. (eds.) Current Themes in Tropical Science Volume 1. Physiology of Ticks. Elsevier Ltd., Pergamon, pp. 277–350.
- Dumbleton, L. J. 1958. Bat infesting *Ornithodoros* (Ixodoidea: Argasidae) of the Oriental-Australia Region. *Proceedings of the Linnean Society of New South Wales* 83: 303–308.
- Durden, L. A., Merker, S. & Beati, L. 2008. The tick fauna of Sulawesi, Indonesia (Acari: Ixodoidea: Argasidae and Ixodidae). *Experimental and Applied Acarology* 45(1-2): 85–110.
- Guglielmone, A. A., Robbins, R. G., Apanaskevich, D. A., Petney, T. N., Estrada-Peña, A., Horak, I. G., Shao, R. & Barker S. C. 2010. The Argasidae, Ixodidae and Nuttalliellidae (Acari: Ixodida) of the world: a list of valid species names. *Zootaxa* 2528: 1–28.
- Hirst, S. 1929. Fauna of Batu caves, Selangor. XI. Arachnida: Acarina (Ixodidae). *Journal of the Federated Malay States Museums* 14: 365.

- Hoogstraal, H. 1985. Argasid and nuttalliellid ticks as parasites and vectors. *Advances in Parasitology* 24: 135–238.
- Kazim, A. R., Houssaini, J., Ehlers, J., Tappe, D. & Heo, C. C. 2021. Soft ticks (Acari: Argasidae) in the island nations of Southeast Asia: A review on their distribution, associated hosts and potential pathogens. *Acta Tropica* 223: 106085.
- Klompen, J. S. H., Keirans, J. E. & Durden, L. A. 1995. Three new species of ticks (Ixodida: Argasidae: *Carios*) from fruit bats (Chiroptera: Pteropodidae) in the Australasian region, with notes on host associations. *Acarologia* 35 (1): 25–40.
- Kohls, G. M. 1950. Ticks (Ixodoidea) of the Philippines. National Institute of Health Bulletin, Washington D.C., pp. 1–28.
- Kwak, M. L. 2018. Ticks in the Lion City: a preliminary review of the tick fauna of Singapore. *Experimental and Applied Acarology* 76 (2): 263–267.
- Leong, T. M., Shunari, M. & Lim, K.K. 2010. The narrow-winged pipistrelle, *Pipistrellus stenopterus* (Dobson) in Singapore (Mammalia: Chiroptera: Vespertilionidae). *Nature in Singapore* 3: 159–165.
- Lopez, J. E., Krishnavahjla, A., Garcia, M.N. & Bermudez, S. 2016. Tick-borne relapsing fever spirochetes in the Americas. *Veterinary Sciences* 3 (3): 16.
- Nadolny, R. M., Kennedy, A. C., Rodgers, J. M., Vincent, Z. T., Cornman, H., Haynes, S. A., Casal, C., Robbins, R. G., Richards, A. L., Jiang, J. & Farris, C. M. 2021. *Carios kelleyi* (Acari: Ixodida: Argasidae) infected with rickettsial agents documented infesting housing in Kansas, United States. *Journal of Medical Entomology* 58 (6): 2398–2405.
- Parrish, D. W. 1971. The occurrence, geographical distribution and wild vertebrate host relationships of ticks (Ixodoidea) on Luzon Island, Philippines, with description of three new species. Ph.D. Dissertation, Oklahoma State University, 108 pp.
- Petney, T. N., Saijuntha, W., Boulanger, N., Chitimia-Dobler, L., Pfeffer, M., Eamudomkarn, C., Andrews, R. H., Ahamad, M., Putthasorn, N., Muders, S. V., Petney, D. A. & Robbins, R. G. 2019. Ticks (Argasidae, Ixodidae) and tick-borne diseases of continental Southeast Asia. *Zootaxa* 4558 (1): 1–89.
- Robbins, R. G. 2005. The ticks (Acari: Ixodida: Argasidae, Ixodidae) of Taiwan: a synonymic checklist. *Proceedings of the Entomological Society of Washington* 107 (2): 245–253.
- Sándor, A. D., Mihalca, A. D., Domşa, C., Péter, Á. & Hornok, S. 2021. Argasid ticks of Palearctic bats: distribution, host selection, and zoonotic importance. *Frontiers in Veterinary Science* 8: 684737.
- Srinivasulu, B. & Srinivasulu, C. 2019. *Scotophilus kuhlii*. The IUCN Red List of Threatened Species 2019: e.T20068A22031278. Accessed on 13 April 2023.
- Uchikawa, K. & Kobayashi, T. 1978. A contribution to the ectoparasite fauna of bats in Thailand II. Blood-sucking Acari (Argasidae, Spinturnicidae and Macronyssidae). *Contributions from the Biological Laboratory, Kyoto University* 25(3): 249–254.
- Vial, L. 2009. Biological and ecological characteristics of soft ticks (Ixodida: Argasidae) and their impact for predicting tick and associated disease distribution. *Parasite* 16 (3): 191–202.
- Wilson, N. 1970. New distributional records of ticks from Southeast Asia and the Pacific (Metastigmata: Argasidae, Ixodidae). *Oriental Insects* 4(1): 37–46.

寄生於蝙蝠（哺乳綱：翼手目）的軟蜱（真蜱目：軟蜱科）之菲律賓新地理紀錄

艾斯^{1,2,3}、理查德·G·羅賓斯^{4,5,6}

¹中央研究院生物多樣性中心 生物多樣性臺灣國際研究生博士學位學程 11529 臺北市南港區

E-mail: ace_amarga061@yahoo.com

²國立臺灣師範大學生命科學專業學院 11677 臺北市文山區

³國際自然保護聯盟物種存續委員會（IUCN SSC）寄生蟲專家組

⁴Walter Reed Biosystematics Unit, Smithsonian Institution, Museum Support Center, Suitland, 馬里蘭州 20910 美國

⁵One Health Branch, Walter Reed Army Institute of Research, Silver Spring, 馬里蘭州 20910 美國

⁶史密森尼學會國家自然歷史博物館昆蟲學 華盛頓特區 20560 美國

摘要：軟蜱科 (Argasidae) 是一個在陸地脊椎動物身上吸血的節肢動物科別，它具有醫學重要性。本文報導了在菲律賓採集到的 *Argas* 屬和 *Ornithodoros* 屬軟蜱寄生於蝙蝠的新地理紀錄。這些紀錄包括首次報導來自 Balabac 島的 *Argas pusillus* Kohls，以及首次記錄在 Batan 島、Bohol 島和 Panay 島的 *Ornithodoros batuensis* Hirst。這些發現有助於我們了解這些蜱蟲在菲律賓的分布情況，進而研究它們對公共衛生的潛在影響。

關鍵詞：軟蜱科、體外寄生蟲、菲律賓、狐蝠科、蝙蝠科

First Record of Bat Flies (Diptera: Hippoboscoidea) on Batan Island, Southern Luzon, Philippines

ACE KEVIN S. AMARGA^{1,2,3}, JEREMIAH S. AMARGA⁴

¹ Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan. Email: ace_amarga061@yahoo.com

² School of Life Science, National Taiwan Normal University- Gongguan Campus, Wenshan District, Taipei 11677, Taiwan

³ International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group

⁴ Department of Forestry, College of Agriculture & Forestry, Bicol University-Guinobatan Campus, Albay, Philippines

Abstract: This preliminary report presents the bat fly fauna on Batan Island, one of the islands constituting the municipality of Rapu-Rapu, Albay province, the Philippines. During a rapid biodiversity assessment conducted in December 2015, six species of bat flies belonging to the genera *Brachytarsina* Macquart, *Eucampsipoda* Kolenati, *Leptocyclopodia* Theodor, *Megastrebla* Maa, and *Nycteribia* Latreille were documented. Before this paper, there were no published records of bat flies on the island, making this paper the first documentation of streblid and nycteribiid bat flies on Batan Island, Philippines.

Keywords: Albay, Chiroptera, ectoparasites, Hippoboscoidea.

Introduction

Batan Island is a small island situated within Lagonoy Gulf. The islands of Batan, Rapu-Rapu, and Guininayan constitute the municipality of Rapu-Rapu, the only island municipality in Albay province, Philippines. The vegetation of Batan Island is characterized by a few remaining secondary forest fragments with admixtures of large areas of coconut plantations (Crispin et al., 1955). Additionally, the island also has fragmented beach forests and karst areas near the shoreline.

Records of bat ectoparasites on Batan Island are relatively scarce and require further documentation. The first published record of bat ectoparasites on Batan Island was by Amarga & Yap (2017), documenting *Eoctenes spasmae* (Waterhouse), a polyctenid bug ectoparasitic to *Megaderma spasma* (Linnaeus) (Lesser false vampire bat). Subsequently, Amarga & Hastriter (2023) reported *Thaumapsylla breviceps* Rothschild in *Eonycteris spelea* (Dobson) (Cave nectar bat), marking the first published record of an ischnopsyllid flea on the island. To date, there have been no published records of bat flies on Batan Island. Therefore, this paper represents the first published report of ectoparasitic flies associated with bats on Batan Island, Albay province, Philippines, and also provides additional records of bat flies on the Bicol Peninsula, Luzon Island.

Material and Methods

Bat fly specimens were collected during the rapid biodiversity inventory on Batan Island, Albay (see Fig. 1), conducted in December 2015. Mist netting was used to capture the host specimens, and the bats were released after the collection of ectoparasite samples. Bat flies were collected using fine-tipped forceps and preserved in 95% ethanol. Specimens were examined under a Leica S9D dissecting microscope. The map used to indicate the study site was obtained from © Maphill/CC BY-ND (2013). Host names were based on the listing by Wilson & Mittermeier (2019). The specimens are currently in the private parasite collection of the first author, and voucher specimens will be deposited in the National Museum of Natural Science (Taiwan).



Figure 1. The map shows the location of Batan Island, Albay province, Philippines (inset, black box).

Results

Order Diptera Linnaeus
Parvorder Calyptratae Robineau-Desvoidy
Superfamily Hippoboscoidea Samouelle
Family Streblidae Kolenati

Brachytarsina amboinensis Rondani, 1878

Material examined: PHILIPPINES: 5♀♀, 1♂, Brgy. Lagundi, Batan Island, Albay province, ex. *Miniopterus eschscholtzii* (Waterhouse), XII.2015, AK Amarga & R Ante leg.

Remarks: This widespread species primarily acts as an ectoparasite on the genus *Miniopterus* Bonaparte (Miniopteridae) and is known to occur throughout the Oriental and Australasian regions (Maa, 1971; Kwak et al., 2022). In the Philippines, *B. amboinensis* is widely distributed and has been recorded on several islands, including Luzon (Cuy, 1980a), Polillo (Cuy, 1980a), Marinduque (Amarga et al., 2017), Tablas (Jobling, 1951), Mindoro (Alvarez et al., 2016), Bohol (Amarga & Phelps, 2021), Siargao (Amarga & Hastriter, 2022), and Mindanao (Jobling, 1951). Furthermore, the *B. amboinensis* specimens documented in this study were collected from a population of *M. eschscholtzii* in an unnamed cave on Batan Island.

Brachytarsina wernerii (Jobling, 1951) (Fig. 2a)

Material examined: PHILIPPINES: 10♀♀, Brgy. Lagundi, Batan Island, Albay province, ex. *Hipposideros diadema* (Geoffroy), XII.2015, AK Amarga & R Ante leg.

Remarks: This Philippine endemic species is primarily associated with insectivorous bats, particularly those of the genus *Hipposideros* Gray. Additionally, it has been reported on *Rhinolophus* Lacépède, *Megaderma* Geoffroy, and *Miniopterus* (Amarga et al., 2017). The record of this species on cave-dwelling Pteropodidae can be considered an accidental occurrence.

Megastrebla parvior (Maa, 1962)

Material examined: PHILIPPINES: 4♀♀, Brgy. Lagundi, Batan Island, Albay province, ex. *Eonycteris spelaea* (Dobson), XII.2015, leg. AK Amarga & R Ante; 1♀, Brgy. Lagundi, Batan Island, Albay province, ex. *Rousettus amplexicaudatus*, XII.2015, AK Amarga & R Ante leg.

Remarks: This species is widespread in the Oriental region, particularly in Southeast Asia (Maa, 1971). *Megastrebla parvior* is the only species under the genus *Megastrebla* Maa documented in the Philippines, and it is parasitic to fruit bats (Pteropodidae), especially those from the genera *Eonycteris* Dobson and *Rousettus* Gray (Maa, 1971).

Family Nycteribiidae Samouelle

***Eucampsipoda sundaica* Theodor, 1955 (Fig. 2b)**

Material examined: PHILIPPINES: 3♀♀, Brgy. Lagundi, Batan Island, Albay province, ex. *Eonycteris spelaea*, XII.2015, AK Amarga & R Ante leg.

Remarks: This species is parasitic on pteropodids and has a wide distribution across Southeast Asia, extending to India (Theodor, 1963; Cuy, 1980b). In the Philippines, it has been documented to associate with the genera *Eonycteris* and *Rousettus* (Cuy, 1980b). Additionally, this species coexists with *M. parvior* and the bat flea *Thaumapsylla* Rothschild.

***Leptocyclopodia simulans* (Theodor, 1959)**

Material examined: PHILIPPINES: 3♀♀, Brgy. Lagundi, Batan Island, Albay province, ex. *Cynopterus luzoniensis* (Peters), XII.2015, AK Amarga & R Ante leg.

Remarks: This species is exclusively parasitic on fruit bats. Additionally, while *L. simulans* is primarily ectoparasitic on *Ptenochirus jagori* (Peters), it has also been recorded on other species, including *C. luzoniensis*, *R. amplexicaudatus*, *E. robusta*, and *M. minimus* (Theodor, 1963; Cuy, 1980b; Amarga & Fornesa, 2020).

***Nycteribia allotopa* Speiser, 1901**

Material examined: PHILIPPINES: 1♀, Brgy. Lagundi, Batan Island, Albay province, ex. *Miniopterus eschscholtzii*, XII.2015, AK Amarga & R Ante leg.

Remarks: This nycteribiid fly has a wide distribution range spanning across the Oriental faunal region (Cuy, 1980b; Amarga et al., 2017), extending into the Palearctic (Maa, 1967; Kim et al., 2012). In the Philippines, *N. allotopa* is associated with the genus *Miniopterus*.

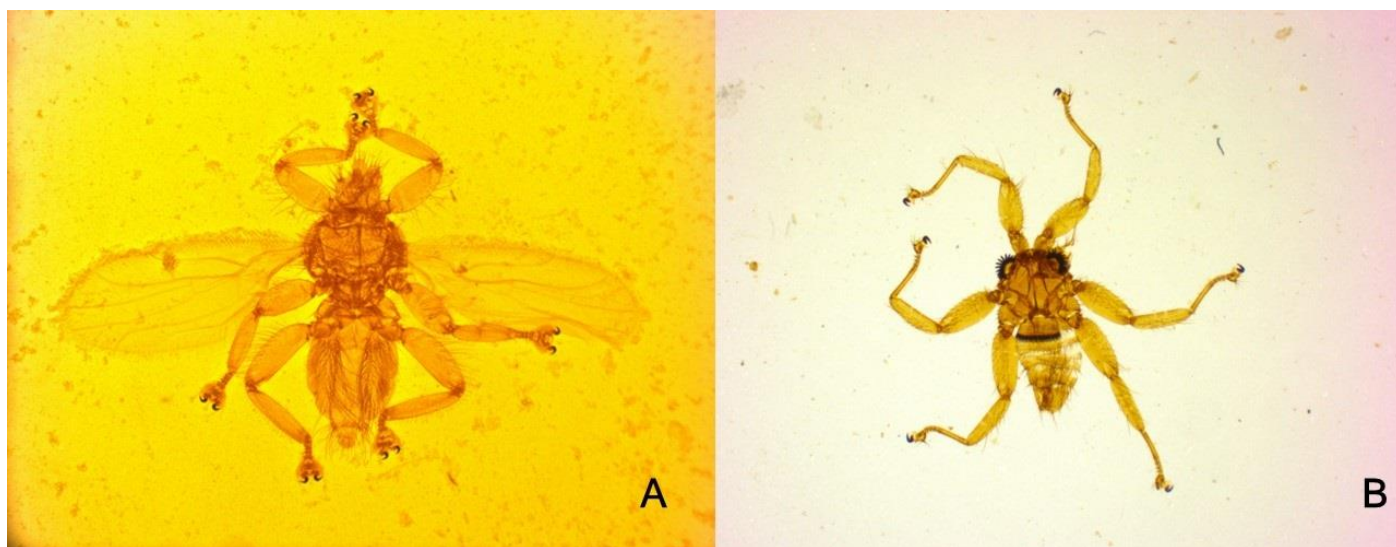


Figure 2. Representative bat fly species recorded on Batan Island, Philippines: (A) *Brachytarsina weneri* (♀, in slide) and (B) *Eucampsipoda sundaica* (♂, in slide).

Acknowledgments

The authors would like to thank DENR-V for providing the fieldwork and collection permit (Wildlife Gratuitous Permit No. R5-69), the Bechayda family for accommodation, and the following individuals for their assistance during the fieldwork: MacIlan Bechayda, Ryan F. Ante, Jake Wilson Binaday, Athena Heart Lobos, Marvin Jake Serrano, Mary Rose Juan, and Dwight Mitchell Dandoy.

References

- Alvarez, J. D. V., Lit, I., Alviola, P. A., Cosco, E. A. & Eres, E. G. 2016. A contribution to the ectoparasite fauna of bats (Mammalia: Chiroptera) in Mindoro Island, Philippines: I. Blood sucking Diptera (Nycteribiidae, Streblidae) and Siphonaptera (Ischnopsyllidae). *International Journal of Tropical Insect Science* 36 (4): 188–194.
- Amarga, A. K. S. & Yap, S. A. 2017. Search for the blind vampire: First record of *Eoctenes* Kirkaldy in Southern Luzon (Hemiptera: Polyctenidae), with key to the Cimicoidea ectoparasitic on bats in the Philippines. *Halteres* 8: 25–29.

- Amarga, A. K. S. & Fornesa, R. N. 2020. First record of the genus *Leptocyclopodia* (Theodor) (Diptera: Nycteribiidae: Cyclopodiinae) in Romblon Island group, with a list of arthropods ectoparasitic on bats in Romblon Province, Philippines. *Thailand Natural History Museum Journal* 14 (2): 131–137.
- Amarga, A. K. S. & Phelps, K. L. 2021. New host and distribution records of bat flies (Diptera: Streblidae, Nycteribiidae) on cave-dwelling bats from Bohol Island, Philippines. *International Journal of Tropical Insect Science* 41: 3213–3222.
- Amarga, A. K. S. & Hastriter, M. W. 2022. First report of the bat ectoparasite fauna on Siargao Island, Philippines. *Taiwanese Journal of Entomological Studies* 7 (4): 50–53.
- Amarga, A. K. S. & Hastriter, M. W. 2023. First record of bat flea *Thaumapsylla breviceps* Rothschild, 1907 (Siphonaptera: Ischnopsyllidae) in Bicol Region, Luzon Island, Philippines. *Historia naturalis bulgarica* 45 (5): 103–106.
- Amarga, A. K. S., Alviola, P. A., Lit, I. L. & Yap, S. A. 2017. Checklist of ectoparasitic arthropods among cave-dwelling bats from Marinduque Island, Philippines. *Check List* 13 (1): 2029.
- Crispin, O., Weller, J. M. & Vergara, J. F. 1955. Geology and coal resources of Batan Island, Albay. Philippine Bureau of Mines Special Projects Series Publication No. 3- Coal, 51 pp.
- Cuy, L. S. 1980a. Nycteriboscinae (Diptera: Streblidae) of the Philippines. *Kalikasan, Philippine Journal of Biology* 9 (2–3): 137–144.
- Cuy, L. S. 1980b. Nycteribiidae (Diptera) of the Philippines. *Kalikasan, Philippine Journal of Biology* 9 (2–3): 145–168.
- Jobling, B. 1951. A record of the Streblidae from the Philippines and other Pacific Islands including morphology of the abdomen, host-parasite relationship and geographical distribution, and with descriptions of five new species (Diptera). *Transactions of the Royal Entomological Society of London* 102 (4): 211–246.
- Kim, H. C., Han, S. H., Dick, C. W., Choi, Y. G., Chong, S. T., Klein, T. A. & Rueda, L. M. 2012. Geographical distribution of bat flies (Diptera: Nycteribiidae and Streblidae), including two new records, *Nycteribia allotopa* and *N. formosana*, collected from bats (Chiroptera: Rhinolophidae and Vespertilionidae) in the Republic of Korea. *Journal of Vector Ecology* 37 (2): 333–337.
- Kwak, M. L., Gorecki, V. & Markowsky, G. 2022. Parasites in peril: abundance of batflies (Diptera: Nycteribiidae) declines along an urbanization gradient. *Journal of Insect Conservation* 26 (4): 627–638.
- Maa, T. C. 1967. A synopsis of Diptera Pupipara of Japan. *Pacific Insects* 9 (4): 727–760.
- Maa, T. C. 1971. Review of the Streblidae (Diptera) parasitic on megachiropteran bats. *Pacific Insects Monograph* 28: 213–243.
- Theodor, O. 1963. Philippine batflies of the family Nycteribiidae (Diptera, Pupipara). *Fieldiana Zoology* 42 (11): 151–192.
- Wilson, D. E., Mittermeier, R. A. 2019. Handbook of the Mammals of the World, volume 9. Bats. Lynx Edicions.

菲律賓巴坦島蝙蝠寄生蠅（雙翅目：蠅蠅總科）的首次紀錄

艾斯^{1,2,3}、傑瑞米亞 S 阿瑪加⁴

¹中央研究院生物多樣性中心 生物多樣性臺灣國際研究生博士學位學程 11529 臺北市南港區

E-mail: ace_amarga061@yahoo.com

²國立臺灣師範大學生命科學專業學院 11677 臺北市文山區

³國際自然保護聯盟物種存續委員會 (IUCN SSC) 寄生蟲專家組

⁴Department of Forestry, College of Agriculture & Forestry, Bicol University-Guinobatan Campus, Albay, 菲律賓

摘要：本研究報導菲律賓阿爾拜省拉普拉普市巴丹島的蝙蝠寄生蠅相。在 2015 年 12 月的一次快速生物多樣性評估中，我們記錄了 *Brachytarsina* 屬、*Eucampsipoda* 屬、*Leptocyclopodia* 屬、*Megastrebla* 屬和 *Nycteribia* 屬的 6 種蝙蝠寄生蠅。在此之前，該島上沒有已發表的蝙蝠寄生蠅紀錄，因此這項研究代表了首次記錄在菲律賓巴丹島上的蝙蝠蠅科和蛛蠅科。

關鍵詞：阿爾拜省、翼手目、體外寄生蟲、蠅蠅總科

[研究文章 Research Article]

<https://doi.org/10.5281/zenodo.8373794>

阿里磅生態農場水棲昆蟲相調查

劉興哲^{1,2,†,*}、陳賜隆^{1,3,†}、唐欣潔^{1,3,†}、馬承漢¹、李宜龍¹、胡芳碩¹、何彬宏⁴、林翰羽¹、周昭蕊^{1,5}

¹臺灣蜻蜓學會 新北市新莊區龍安路5號2樓

²多樣性生態顧問有限公司 臺中市霧峰區仁德巷12弄37號

³臺北市立動物園保育研究中心 臺北市文山區新光路二段 30 號

⁴國立中山大學生物科學系 高雄市鼓山區蓮海路70號

⁵阿里磅生態農場 新北市石門區阿里磅路84號

†共同第一作者 (此作者群具相同貢獻)

*通訊作者: td965771@gmail.com

摘要：阿里磅生態農場位於臺灣北部大屯火山群的低海拔地區，農場內及周邊具有豐富的濕地資源與水生昆蟲相。本研究整述阿里磅生態農場及附近的阿里磅溪之水棲昆蟲相，物種資料來自於 2003 年至 2023 年的蜻蜓目 (Odonata) 長期監測及 2023 年的水棲昆蟲調查，共計 7 目 45 科 136 種，其中鉗皮麗陽牙蟲 (*Peltochares atropiceus*) 首次發現於臺灣本島。

關鍵詞：水棲昆蟲、臺灣、新紀錄、大屯火山群、亞熱帶

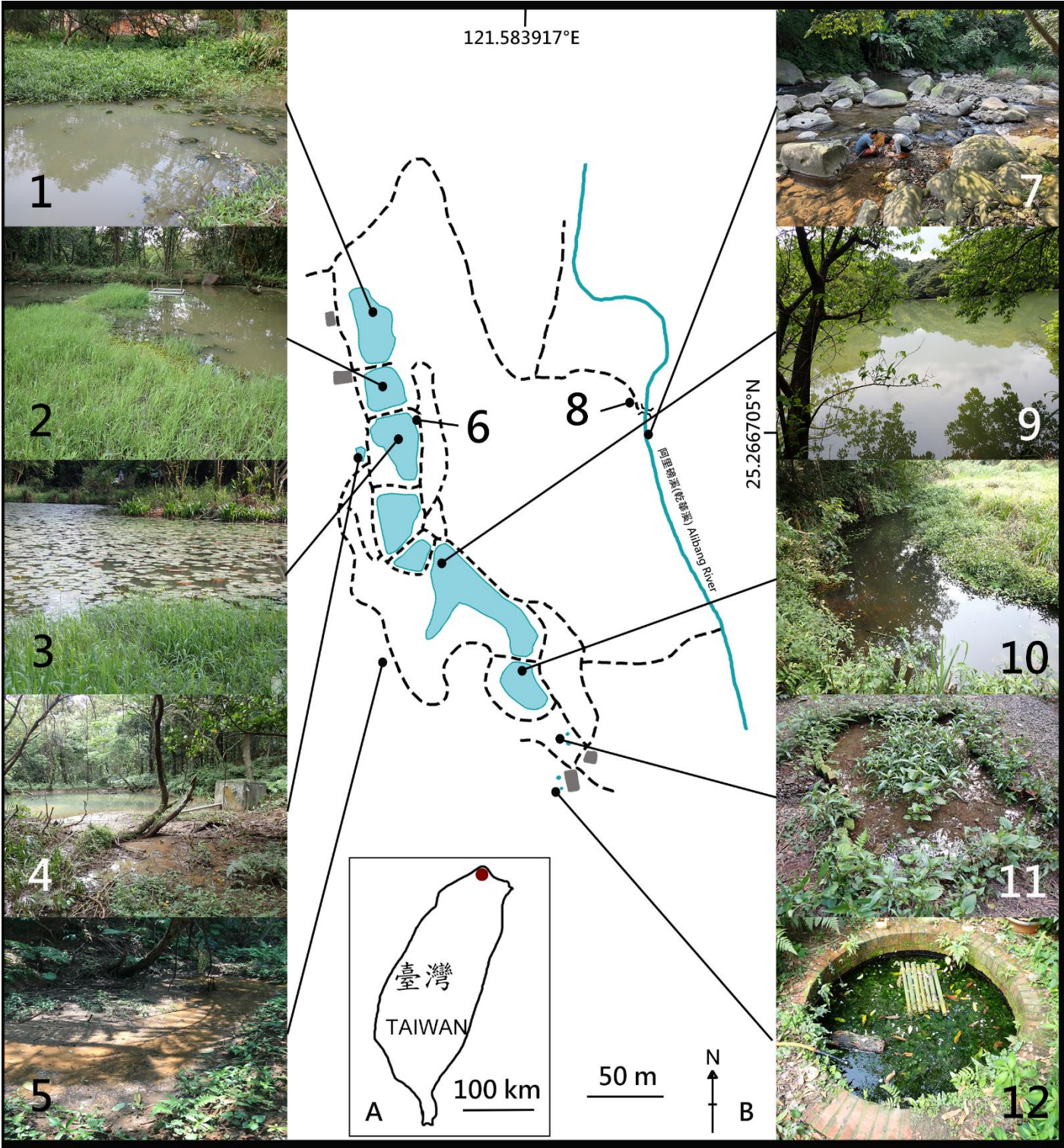
前言

阿里磅生態農場 (Alibang Eco-Farm) 位於新北市石門區的低海拔地區 (N25.264, E121.5836)，海拔 100 至 200 公尺，總面積約 10.3 公頃，南側靠近陽明山國家公園，相距約 2.2 公里，同屬於大屯火山群的範圍內 (圖一 A)，由於人為開發較低而保有許多良好的濕地環境。1990 年代後期，出生於北海的王德昌老師秉持「與其累積財富，不如為後人保留一方自然的土地」的理念，與數十個家庭集資購地，最終於 1997 年成立阿里磅生態農場。2022 年起，阿里磅生態農場委託社團法人台灣環境資訊協會管理，提供民眾參與生態體驗、認識大自然等活動，為環境教育做出貢獻 (Wang, 2007; Alibang Eco-Farm, 2023)。

阿里磅生態農場過去雖未有正式的水棲昆蟲調查，但鄰近的陽明山國家公園具有許多有關水棲昆蟲的研究 (Yang & Lee, 1992; Yang & Wang, 1997)，也不乏涵蓋陸生昆蟲的範疇 (Luo, 1996; Hsu & Lee, 2016)，近年 Hsu (2021) 的報告更是歷年來最詳細的水棲昆蟲報告，調查範圍包含流水環境及靜水環境，共計 9 目 59 科 203 種，其中蜻蜓目 (Odonata) 物種數最為豐富。為了更瞭解阿里磅生態農場水棲昆蟲資源，本次研究委託臺灣蜻蜓學會於 2023 年 4 月組織研究團隊進行現地調查，蜻蜓目調查則始於為 2003 年至今的長期監測。

材料與方法

本次研究調查 2023 年 4 月 3 日至 2023 年 4 月 4 日的水棲昆蟲，樣點分為 8 個靜止水域及 4 個流動水域，共計 12 個樣點 (表一)，並合併 2003 年至 2023 年 4 月的蜻蜓目長期監測資料，範圍包含阿里磅生態農場的各式水域及周邊的阿里磅溪 (圖一 B)。採集用具使用網竿長 70 公分搭配網框長 45 公分之 D 形撈網採集，方法為目視撈法及水撈法。成蟲以乾燥標本處理 (蜻蜓目鑑定後放回)，幼蟲 (稚蟲) 以 75% 酒精保存，存證標本存放於國立中興大學昆蟲標本館 (NCHU Museum of Entomology, Taichung City, Taiwan) 與第一作者所藏 (HCLC: H.-C. Liu's private collection, Hsinchu, Taiwan)，標本以 Leica EZ4 實體顯微鏡觀察，相片以 OLYMPUS Stylus Tough TG-6 與 Canon EOS R5 相機拍攝，地圖由 Adobe Photoshop CS6 繪製。



圖一、阿里磅生態位置及環境照。A – 臺灣本島地圖，B – 阿里磅生態農場地圖及環境照。

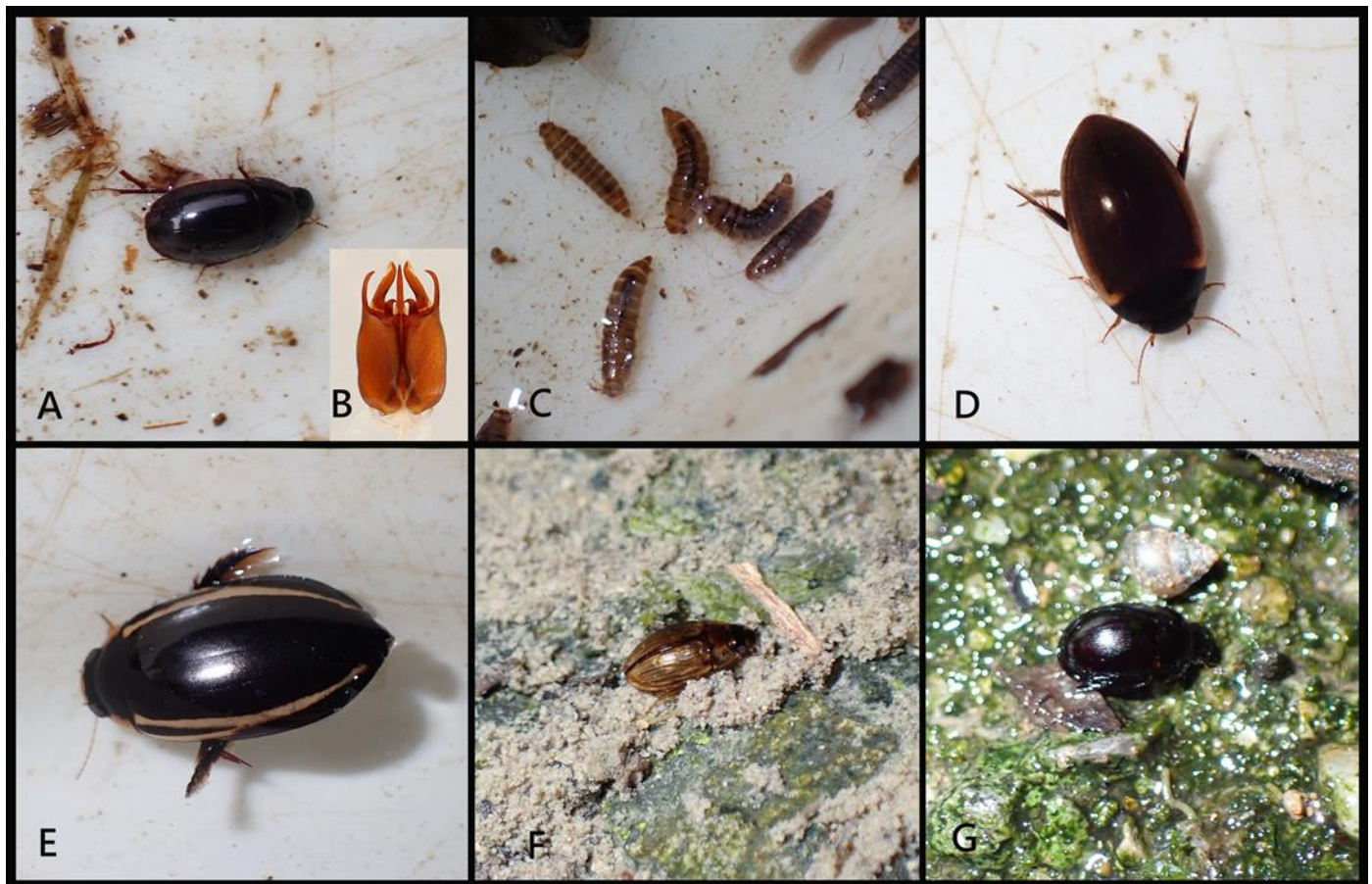
表一、各樣點座標及環境簡介

樣點	經緯度座標	環境簡介
1	25.267793°N, 121.582005°E	水深較淺的池塘，池中有一些水生植物。
2	25.267186°N, 121.582005°E	原為荷花池，但現無荷花生長，禾本科植物茂密。
3	25.266696°N, 121.582071°E	佈滿蓮花的靜水池塘，周緣禾本科植物。
4	25.266634°N, 121.581692°E	森林小溪流匯集成的池塘，周緣林相良好。
5	25.265198°N, 121.582312°E	步道旁的小溪流，水流相當緩。
6	25.266257°N, 121.582503°E	第3樣點池塘旁的溪流。

7	25.266380°N, 121.585479°E	阿里磅溪 (乾華溪)，水流較湍急，人為破壞少。
8	25.266939°N, 121.585501°E	阿里磅溪 (乾華溪) 旁的一處緩流水流至路面形成的積水
9	25.265910°N, 121.582484°E	阿里磅生態農場最大的池塘，水深較深。
10	25.264932°N, 121.583173°E	水生植物密集的池塘。
11	25.264562°N, 121.583288°E	人為建造的 3 座小池塘，水深僅有 5 至 15 公分。
12	25.264239°N, 121.582804°E	位於建築物前方，由水缸、人造淺池組成。

結果

鞘翅目 (Coleoptera) 共計 9 科 18 屬 19 種 (表二)，以龍蟲科 (Dytiscidae) 和牙蟲科 (Hydrophilidae) 物種數最為豐富，兩者佔比達本次調查鞘翅目物種數的 52.6%，靜止水域的物種數遠多於流動水域。本次研究於第 2 樣點採得 4 隻錨皮麗陽牙蟲 (*Peltochares atropiceus*)，過去此種的臺灣記錄僅在金門群島和澎湖群島 (Liu et al., 2020b, 2021)，因此為臺灣本島首次紀錄，本樣點的水質混濁，植物腐爛物質眾多，另發現非常大量的圓花蚤 (*Scirtes* sp.)；日本豆龍蟲 (*Agabus japonicus*)、蒼白牙蟲屬 (*Enochrus* sp.) 與黃紋麗龍蟲 (*Hydaticus vittatus*) 僅在阿里磅溪的道路積水發現，道路積水的水源是從路邊少量的芋頭田流出，推測可能是從芋頭田中擴散出的族群；法拉陷口牙蟲 (*Coelostoma fallacosum*) 通常棲息於靜止的池塘邊 (Liu et al., 2020a)，在本次研究中發現數隻棲息於第 8 樣點的緩流水域旁；具觀賞價值的黃緣螢 (*Aquatica ficta*) 在本次研究中未發現成蟲，Tsai (2017) 表示臺北市的成蟲高峰期为 4 至 5 月，然而本次未發現成蟲可能為調查日期仍略早且氣溫偏低導致，但幼蟲可見於阿里磅溪旁的第 8 樣點及第 12 樣點。



圖二、阿里磅生態農場及阿里磅溪的鞘翅目昆蟲。A – 錨皮麗陽牙蟲 (*Peltochares atropiceus*)，B – 錨皮麗陽牙蟲的雄性生殖器，C – 圓花蚤屬待定種 (*Scirtes* sp.) 幼蟲，D – 日本豆龍蟲 (*Agabus japonicus*)，E – 黃紋麗龍蟲 (*Hydaticus vittatus*)，F – 蒼白牙蟲屬待定種 (*Enochrus* sp.)，G – 法拉陷口牙蟲 (*Coelostoma fallacosum*)。

半翅目 (Hemiptera) 共計 11 科 18 屬 20 種 (表二)，物種數相當豐富，僅次於蜻蜓目，在本次調查的半數樣點可發現，其中以第 10 樣點最為豐富，可能是由於此樣點以靜止水域為主，水生植物覆蓋高，且邊緣偶有樹林遮蔭，適合水棲半翅目棲息。蜉蝣目 (Ephemeroptera) 5 科 8 種，棲息於流水的物種達 8 種，其中臺灣蜉蝣 (*Ephemera formosana*) 可在阿里磅溪發現大量族群，此種普遍分布於臺灣低海拔地區，與紹德氏蜉蝣 (*Ephemera sauteri*) 近似，但後者僅棲息於海拔 2,000

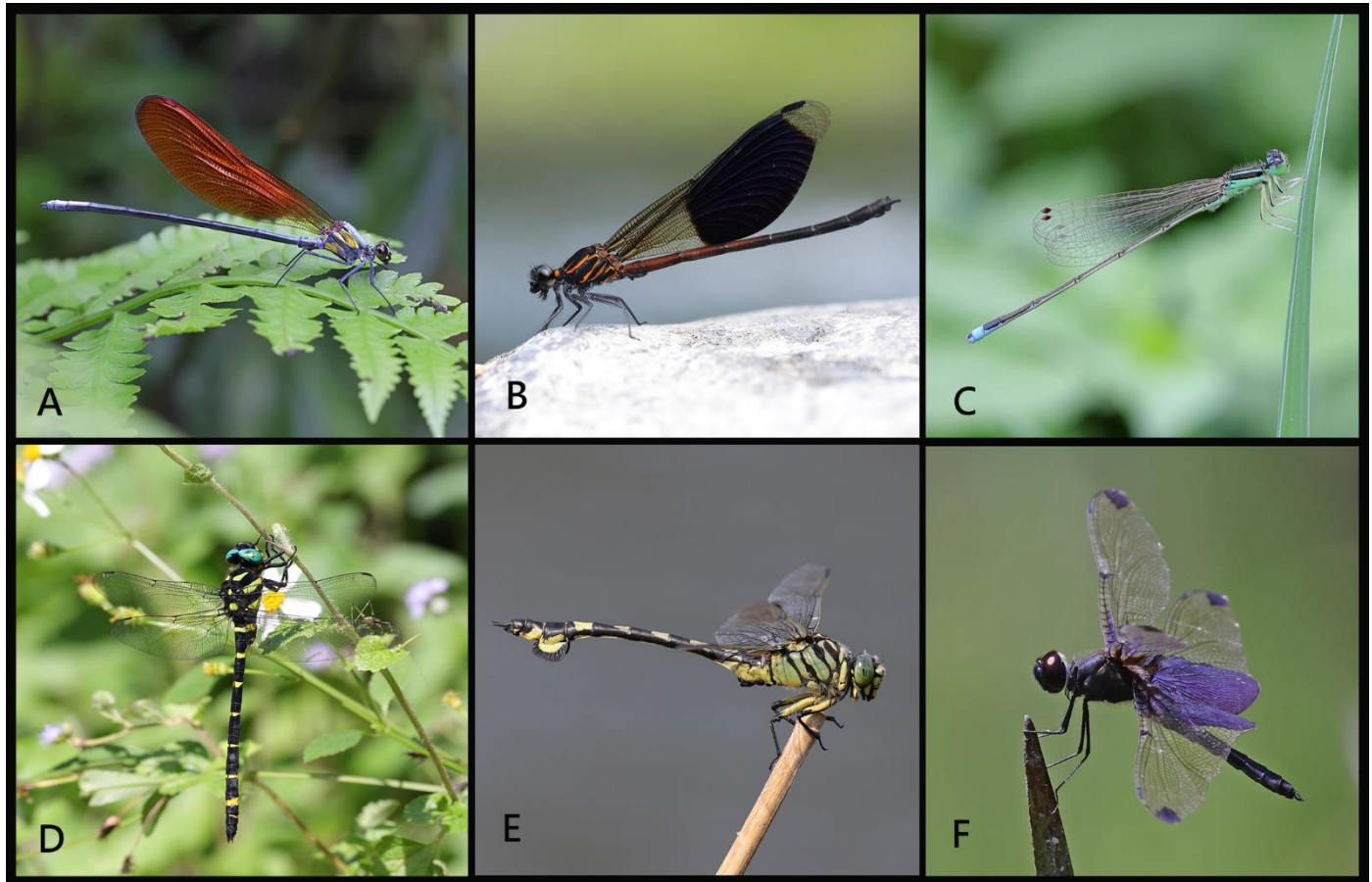
公尺以上的地區 (Kang & Yang, 1994; Hwang & Bae, 2008)。毛翅目 (Trichoptera) 與雙翅目 (Diptera) 除白線斑蚊 (*Aedes albopictus*) 外，皆僅採得幼蟲，兩者物種數分別為 2 科 3 屬 3 種及 5 科 5 屬 6 種 (表二)，由於臺灣對於毛翅目與雙翅目的幼蟲研究仍普遍缺乏，因此多數物種無法鑑定至種級。襍翅目 (Plecoptera) 共記錄 2 科 2 屬 2 種 (表二)，所有物種皆發現於流水環境，石蠅科 (Perlidae) 採集於阿里磅溪的石頭下，短尾石蠅科 (Nemouridae) 普遍棲息於阿里磅生態農場的各式流水環境。



圖三、阿里磅生態農場及阿里磅溪的水棲昆蟲。A – 黃綠螢 (*Aquatica ficta*) 幼蟲，B – 斑節水螳螂 (*Ranatra incisa*)，C – 臺灣蜉蝣 (*Ephemera formosana*) 稚蟲，D – 合脈石蛾屬待定種 (*Cheumatopsyche* sp.) 幼蟲，E – 白線斑蚊 (*Aedes albopictus*)，F – 石蠅科待定種 (*Perlidae* sp.) 稚蟲。

蜻蜓目自 2003 年起開始調查累積資料，至今共計有 11 科 52 屬 78 種 (表二)，約佔臺灣目前可見的蜻蜓目總數的二分之一，其中大部分的紀錄以成蟲為主，其中 2003 年曾經紀錄到 2 隻罕見的黃腹細蟴 (*Ceriagrion melanurum*) 成蟲，黃腹細蟴過去曾記錄於臺北市的南港、內雙溪、松山，以及新北的八里、碧山、坪林、深坑、石碇、萬里 (Lieftinck et al., 1984; Matsuki & Lien, 1985; Matsuki & Lien, 1989)，近年僅於新北市的貢寮山區有紀錄，而該紀錄應為黃腹細蟴近 20 年除了貢寮以外的珍貴紀錄。

在 2023 年 4 月，除了對阿里磅生態農場也對鄰近的阿里磅溪進行採集，並進行稚蟲及成蟲的調查，其中天王蜉 (*Macromia urania*) 與曲尾春蜉 (*Heliogomphus retroflexus*) 為稚蟲紀錄。由於 4 月份的調查為春夏之際，園區內林邊小溪流可以見到少量早春出現的細胸蜉 (*Mnais tenuis*)。而有些物種雖然在農場及阿里磅溪都有紀錄，但棲地應偏好於阿里磅溪，如短腹幽蟴 (*Euphaea formosa*)，其中無霸勾蜉 (*Anotogaster klossi*) 就偏好在園區內的林下小溝渠，其他像細鉤春蜉 (*Sinictinogomphus clavatus*)、賽琳蜉 (*Rhyothemis severini*) 等，多在池沼的環境可以觀察到活動的成蟲。而無霸勾蜉為蜻蜓目昆蟲中唯一的保育類，在園區內及阿里磅溪皆有紀錄，尤其在 5 號及 11 號樣點的環境可以觀察到不少水蠶躲藏於泥沙之中。阿里磅位於臺灣的北部，是東北季風首當其衝的區域，而臺灣有數種曾被記錄的迷蜉，幾乎都在東北季風來襲之際被發現，尤其是赤蜉屬 (*Sympetrum*) 的物種 (Ma et al. 2022)，但目前阿里磅生態農場有記錄到的遷移性蜉種僅有亞東細蟴 (*Ischnura asiatica*) 及綠胸晏蜉 (*Anax julius*)，未來可以增加在秋天的觀察，提高其對其他遷移性蜉種的調查。



圖四、阿里磅生態農場及阿里磅溪的蜻蜓目成蟲。A – 細胸珈蟌 (*Mnais tenuis*)，B – 短腹幽蟌 (*Euphaea formosa*)，C – 亞東細蟌 (*Ischnura asiatica*)，D – 無霸勾蟌 (*Anotogaster klossi*)，E – 細鉤春蟌 (*Sinictinogomphus clavatus*)，F – 賽琳蜻蜓 (*Rhyothemis severini*)。

表二、阿里磅生態農場及阿里磅溪之水棲昆蟲名錄

目 (Order)	科 (Family)	物種 (Species)	中文俗名	分布樣點	環境
鞘翅目	龍蝨科	<i>Agabus japonicus</i>	日本豆龍蝨	8	靜水
		<i>Cybister rugosus</i>	橙斑大龍蝨	3	靜水
		<i>Cybister tripunctatus lateralis</i>	點刻三線大龍蝨	3	靜水
		<i>Hydaticus vittatus</i>	黃紋麗龍蝨	8	靜水
		<i>Hydrovatus remotus</i>	島嶼圓龍蝨	2, 3	靜水
		<i>Canthydrus nitidulus</i>	光澤方胸龍蝨	3	靜水
	方胸龍蝨科				
	小頭水蟲科	<i>Peltodytes sinensis</i>	中華巨基小頭水蟲	3	靜水
	牙蟲科	<i>Agraphydrus variabilis</i>	變異阿牙蟲	7	緩流
		<i>Coelostoma fallacsum</i>	法拉陷口牙蟲	1, 8	水域旁
		<i>Enochrus</i> sp.	蒼白牙蟲屬待定種	8	靜水
		<i>Helochaers sauteri</i>	紹德麗陽牙蟲	7	緩流
		<i>Peltochaers atropiceus</i>	錨皮麗陽牙蟲	2	靜水
		<i>Hydraena compressipilis</i>	伏毛細牙蟲	7	緩流
	細牙蟲科				
	圓花蚤科	<i>Scirtes</i> sp.	圓花蚤屬待定種	2	靜水
	螢科	<i>Aquatica ficta</i>	黃綠螢	8, 12	靜水
	扁泥蟲科	<i>Mataeopsephus taiwanicus</i>	臺灣六鰓扁泥蟲	7	緩流
		<i>Macroebria</i> sp.	條背扁泥蟲屬待定種	11	靜水
		<i>Schinostethus satoi</i>	烏來扇角扁泥蟲	4	緩流
		<i>Elmidae</i> sp.	長角泥蟲科待定種	7	急流
	長角泥蟲科				

半翅目	負蝽科	<i>Diplonychus rusticus</i>	大負子蟲	3	靜水
	蝸蝽科	<i>Laccotrephes pfeifferiae</i>	大紅娘華	11	靜水
		<i>Ranatra incisa</i>	斑節水螳螂	10	靜水
	尺蝽科	<i>Hydrometra okinawana</i>	沖繩尺蝽	4, 8	緩流
	寬肩蝽科	<i>Microvelia cf. douglasi</i>	道氏小寬肩蝽	11, 12	靜水
		<i>Microvelia iriomotensis</i>	西表小寬肩蝽	11	靜水
		<i>Microvelia kyushuensis</i>	九州小寬肩蝽	10	靜水
		Veliidae sp.	寬肩蝽科待定種	7	靜水
	膜椿科	<i>Timasius minamikawai</i>	黑胸麗膜椿	7	緩流
	仰蝽科	<i>Enithares sinica</i>	中華粗仰蝽	10	靜水
		<i>Anisops</i> sp.	小仰蝽屬待定種	10	靜水
	固頭蝽科	<i>Paraplea</i> sp.	鄰固蝽屬待定種	3	靜水
	划蝽科	<i>Sigara</i> sp.	划蝽屬待定種	8	靜水
	黽蝽科	<i>Amemboa fumi</i>	臺灣東方黽蝽	7	緩流
		<i>Aquarius elongatus</i>	長翅大黽蝽	1, 10	靜水
		<i>Gerris gracilicomis</i>	褐斜斑黽蝽	3	靜水
		<i>Metrocoris esakii</i>	江崎氏闊黽蝽	5, 7	緩流
		<i>Neogerris parvulus</i>	小緣背黽蝽	10	靜水
		<i>Ochterus marginatus</i>	蝽蝽	5	水域旁
		<i>Valleriola javanica</i>	爪哇細腳蝽	7	水域旁
蜉蝣目	蜉蝣科	<i>Ephemera formosana</i>	臺灣蜉蝣	7	急流
	扁蜉科	<i>Afronurus hyalinus</i>	透翅亞非蜉	7	急流
	四節蜉科	<i>Acentrella</i> sp.	狹翅蜉屬待定種	7	緩流
		Baetidae sp.1	四節蜉科待定種	7	緩流
		Baetidae sp.2	四節蜉科待定種	3	靜水
	褐蜉科	Leptophlebiidae sp.	褐蜉科待定種	7	緩流
	短絲蜉科	<i>Ameletus</i> sp.1	短絲蜉屬待定種	3	靜水
		<i>Ameletus</i> sp.2	短絲蜉屬待定種	3	靜水
毛翅目	紋石蛾科	<i>Cheumatopsyche</i> sp.	合脈石蛾屬待定種	7	急流
		Hydropsychidae sp.	紋石蛾科待定種	6	緩流
	指石蛾科	<i>Chimarra</i> sp.	缺叉石蛾屬待定種	6	緩流
雙翅目	搖蚊科	Chironomidae sp. 1	搖蚊科待定種	2, 3, 8	靜水
		Chironomidae sp. 2	搖蚊科待定種	7	緩流
	流虻科	<i>Atherix</i> sp.	流虻屬待定種	7	緩流
	水蠅科	Ephydriidae sp.	水蠅科待定種	12	靜水
	蚊科	<i>Aedes albopictus</i>	白線斑蚊	12	靜水
	蚋科	<i>Simulium</i> sp.	蚋屬待定種	4	緩流
禿翅目	石蠅科	Perlidae sp.	石蠅科待定種	7	緩流
	短尾石蠅科	Nemouridae sp.	短尾石蠅科待定種	4, 5, 6	靜水
蜻蜓目	珈蟴科	<i>Matrona cyanoptera</i>	白痣珈蟴	農場內、阿里磅溪	-
		<i>Mnais tenuis</i>	細胸珈蟴	農場內	-
		<i>Psolodesmus mandarinus mandarinus</i>	中華珈蟴指名亞種	農場內、阿里磅溪	-
	細蟴科	<i>Agriocnemis femina</i>	白粉細蟴	農場內	-
		<i>Agriocnemis pygmaea</i>	橙尾細蟴	農場內	-
		<i>Ceriagrion auranticum ryukyuanum</i>	紅腹細蟴	農場內	-
		<i>Ceriagrion fallax</i>	昧影細蟴	農場內	-
		<i>Ceriagrion melanurum</i>	黃腹細蟴	農場內	-
		<i>Ischnura asiatica</i>	亞東細蟴	農場內	-
		<i>Ischnura senegalensis</i>	青紋細蟴	農場內、阿里磅溪	-
		<i>Paracercion calamorum dyeri</i>	葦笛細蟴	農場內	-
		<i>Pseudagrion microcephalum</i>	瘦面細蟴	農場內	-

幽蟬科	<i>Pseudagrion pilidorsum pilidorsum</i>	弓背細蟬	農場內	-
	<i>Bayadera brevicauda</i>	短尾幽蟬	農場內	-
	<i>Euphaea formosa</i>	短腹幽蟬	農場內、阿里磅溪	-
棘蟬科	<i>Rhipidolestes aculeatus aculeatus</i>	芽痣棘蟬	農場內	-
琵琶科	<i>Coelliccia cyanomelas</i>	青黑琵琶	農場內	-
	<i>Copera marginipes</i>	脛蹠琵琶	農場內	-
	<i>Pseudocopera ciliata</i>	環紋琵琶	農場內	-
鼓蟬科	<i>Prodasineura croconota</i>	朱背琵琶	農場內	-
	<i>Heliocypha perforata perforata</i>	棋紋鼓蟬	阿里磅溪	-
	<i>Anaciaeschna martini</i>	烏基晏蜓	農場內	-
晏蜓科	<i>Anax guttatus</i>	烏點晏蜓	農場內	-
	<i>Anax nigrofasciatus nigrofasciatus</i>	烏帶晏蜓	農場內	-
	<i>Anax panybeus</i>	麻斑晏蜓	農場內	-
	<i>Anax julius</i>	綠胸晏蜓	農場內、阿里磅溪	-
	<i>Gynacantha subinterrupta</i>	長鉞晏蜓	農場內	-
	<i>Gynacantha japonica</i>	倭鉞晏蜓	農場內	-
	<i>Gynacantha ryukyuensis</i>	琉球晏蜓	農場內	-
	<i>Indaeschna erythromelas</i>	朱黛晏蜓	農場內	-
	<i>Indaeschna melanictera</i>	描金晏蜓	農場內	-
	<i>Indaeschna ornithocephala</i>	喙鉞晏蜓	農場內	-
	<i>Periaeschna magdalena</i>	柱鉞晏蜓	農場內	-
	<i>Planaeschna ishigakiana flavostria</i>	石垣晏蜓	農場內	-
	<i>Planaeschna risi risi</i>	李斯晏蜓	農場內、阿里磅溪	-
	<i>Planaeschna taiwana</i>	陽明晏蜓	農場內	-
勾蜓科	<i>Anotogaster klossi</i>	無霸勾蜓	農場內、阿里磅溪	-
斑蜓科	<i>Chlorogomphus risi</i>	褐翼斑蜓	農場內	-
	<i>Chlorogomphus suzukii</i>	斑翼斑蜓	農場內	-
	<i>Asiagomphus hainanensis</i>	海南春蜓	農場內	-
春蜓科	<i>Asiagomphus septimus</i>	鉤紋春蜓	農場內、阿里磅溪	-
	<i>Gomphidia confluens</i>	聯紋春蜓	農場內	-
	<i>Heliogomphus retroflexus</i>	曲尾春蜓	阿里磅溪	-
	<i>Ictinogomphus rapax</i>	粗鉤春蜓	農場內	-
	<i>Leptogomphus sauteri</i>	紹德春蜓	農場內	-
	<i>Sieboldius deflexus</i>	闊腹春蜓	農場內	-
	<i>Sinictinogomphus clavatus</i>	細鉤春蜓	農場內、阿里磅溪	-
	<i>Stylogomphus shirozui shirozui</i>	錘角春蜓	農場內	-
蜻蜓科	<i>Acisoma panorpoides</i>	粗腰蜻蜓	農場內	-
	<i>Brachydiplax chalybea</i>	橙斑蜻蜓	農場內	-
	<i>Brachythemis contaminata</i>	褐斑蜻蜓	農場內	-
	<i>Crocothemis servilia</i>	猩紅蜻蜓	農場內、阿里磅溪	-
	<i>Diplacodes trivialis</i>	侏儒蜻蜓	農場內	-
	<i>Hydrobasileus croceus</i>	硃紅蜻蜓	農場內	-
	<i>Lyriothemis elegantissima</i>	廣腹蜻蜓	農場內	-
	<i>Lyriothemis flava</i>	樹穴蜻蜓	農場內、阿里磅溪	-
	<i>Nannophyopsis clara</i>	漆黑蜻蜓	農場內	-
	<i>Neurothemis taiwanensis</i>	善變蜻蜓	農場內	-
	<i>Orthetrum glaucum</i>	金黃蜻蜓	農場內、阿里磅溪	-
	<i>Orthetrum luzonicum</i>	呂宋蜻蜓	農場內	-
	<i>Orthetrum melania continentale</i>	灰黑蜻蜓	農場內	-
	<i>Orthetrum pruinsum neglectum</i>	霜白蜻蜓	中印亞種	-
	<i>Orthetrum sabina sabina</i>	杜松蜻蜓	農場內	-

	<i>Orthetrum triangulare triangulare</i>	鼎脈蜻蜓	農場內、阿里磅溪	-
	<i>Pantala flavescens</i>	薄翅蜻蜓	農場內、阿里磅溪	-
	<i>Pseudothemis zonata</i>	黃紉蜻蜓	農場內	-
	<i>Rhyothemis regia regia</i>	藍黑蜻蜓	農場內	-
	<i>Rhyothemis severini</i>	賽琳蜻蜓	農場內	-
	<i>Rhyothemis triangularis</i>	三角蜻蜓	農場內	-
	<i>Rhyothemis variegata arria</i>	彩裳蜻蜓	農場內	-
	<i>Sympetrum eroticum ardens</i>	焰紅蜻蜓	農場內	-
	<i>Tramea transmarina euryale</i>	海霸蜻蜓微斑亞種	農場內	-
	<i>Trithemis aurora</i>	紫紅蜻蜓	阿里磅溪	-
	<i>Urothemis signata yiei</i>	褐基蜻蜓臺灣亞種	農場內	-
	<i>Zygonyx takasago</i>	高砂蜻蜓	農場內、阿里磅溪	-
	<i>Zyxomma petiolatum</i>	纖腰蜻蜓	農場內	-
蜚蠊科	<i>Epophthalmia elegans</i>	慧眼蜚蠊	農場內	-
	<i>Macromia urania</i>	天王蜚蠊	農場內	-

備註：蜻蛉目部分採用成蟲的目視法鑑定，因此不記錄環境類型，分布樣點的「農場內」指阿里磅生態農場。

誌謝

本報告為阿里磅生態農場委託臺灣蜻蜓學會調查，調查中特別感謝阿里磅生態農場的協助。感謝李奇峯博士鑑定扁泥蟲科及徐歷鵬教授鑑定毛翅目成蟲，以及感謝王德昌先生及王素珍小姐協助蜻蜓調查。

引用文獻

- Alibang Eco-Farm. 2023. Available from: <https://www.albeecofarm.com/> (accessed 20 April 2023). (in Chinese)
- Hsu, Y. F. 2021. Survey of Aquatic Insects in Yangmingshan National Park. Yangmingshan National Park Headquarters 156 pp. (in Chinese)
- Hsu, Y. F. & Lee, C.-F. 2016. Survey on Diversity of Coleoptera. Yangmingshan National Park Headquarters 90 pp. (in Chinese)
- Hwang, J. M. & Bae, Y. J. 2008. Review of the tropical Southeast Asian *Ephemera* (Ephemeroptera: Ephemeridae). *Aquatic Insects* 30 (2):105–126.
- Kang, S.-C. & Yang, C.-T. 1994. Ephemeroptera of Taiwan (Ephemeroptera). *Chinese Journal of Entomology* 14: 391–399.
- Lieftinck, M. A., Lien, J.-C., & Ma, T.-C. 1984. Catalogue of Taiwanese dragonflies (Insecta: Odonata). Taichung, Taiwan, *Asian Ecological Society*: 21–26.
- Liu, H.-C., Hu, F.-S. & Fikáček, M. 2020a. Review of the genus *Coelostoma* of Taiwan with description of a new species (Coleoptera:Hydrophilidae). *Acta Entomologica Musei Nationalis Pragae* 60 (1): 155–162.
- Liu, H.-C., Lin, J.-H. & Zheng, K.-Y. 2020b. Notes on Water Beetle (Insecta: Coleoptera) of Penghu Islands, Taiwan. *Taiwanese Journal of Entomological Studies* 5 (4): 49–60. (in Chinese)
- Liu, H.-C., Ma, C.-H. & Fikáček, M. 2021. Water scavenger beetles of Kinmen County, Taiwan (Coleoptera: Hydrophilidae). *Taiwan Journal of Biodiversity* 23 (1): 39–62.
- Luo, S.-Y. 1996. Survey of Insect in Yangmingshan National Park - Large Insects. Yangmingshan National Park Headquarters 52 pp. (in Chinese)
- Ma, C.-H., Chen, S.-L., Lou, C.-M., Lee, I.-L. & Hu, F.-S. 2022. The genus *Sympetrum* Newman, 1833 (Odonata: Libellulidae) in Taiwan: Distribution, bionomics and a report of a newly recorded species. *Taiwanese Journal of Entomological Studies* 7 (3): 27–42.
- Matsuki, K. & Lien, J.-C. 1985. On a collection of the coenagrionid damselflies of Taiwan. *Journal of Kyushu Entomological Society* 6: 1–18.
- Matsuki, K. & Lien, J.-C. 1989. Additional notes on the coenagrionid dragonflies of Taiwan. *Gracie* 41: 1–10.
- Tsai, M.-C. 2017. Investigation of Habitat Restoration for the Firefly *Aquatica ficta* in Daan Forest Park (Taipei). Department of Bioenvironmental Systems Engineering, National Taiwan University, 69 pp. (in Chinese)
- Wang, T.-C. 2007. A Study of the Ecotourists Satisfaction towards the Personal Interpretation of the Aliban Ecofarm. Department of Natural Resources and Environmental Studies, National Dong Hwa University, 141 pp. (in Chinese)

- Yang, P.-S. & Lee, C.-F. 1992. Ecological Survey of Aquatic Animals in Datun Natural Park. Yangmingshan National Park Headquarters 26 pp. (in Chinese)
- Yang, P.-S. & Wang, L.-J. 1997. Taxonomy of Aquatic Adephaga in Yangmingshan National Park. Yangmingshan National Park Headquarters 22 pp. (in Chinese)

Survey of Aquatic Insects Fauna in Alibang Eco-Farm, Taiwan

HSING-CHE LIU^{1, 2, †, *}, SZU-LUNG CHEN^{1, 3, †}, HSIN-CHIEH TANG^{1, 3, †}, CHENG-HAN MA¹, I-LUNG LEE¹, FANG-SHUO HU^{1, 4}, BIN-HONG HO⁴, HAN-YUU LIN¹, CHAO-JUI CHOU^{1, 5}

¹Dragonfly Association of Taiwan, 2F., No. 5, Long'an Rd., Xinzhuang Dist., New Taipei City 24260, Taiwan.

²Diversity Ecological Consultant Ltd., No.37, Rende Rd., Taichung City 413, Taiwan.

³Taipei Zoo, No. 30, Sec. 2, Xinguang Rd., Wenshan Dist., Taipei City 11656, Taiwan.

⁴Department of Biological Sciences, National Sun Yat-sen University, 70 Lienhai Rd., Kaohsiung 80424, Taiwan.

⁵Alibang Eco-Farm, No. 84, Alibang Road, Shimen District, New Taipei City, Taiwan.

[†]Co-first authors (these authors are equally contributed)

*Corresponding author: td965771@gmail.com

Abstract. Alibang Eco-Farm is situated in the low-altitude region of the Datun Volcano Group in northern Taiwan, renowned for its rich wetland resources and diverse aquatic insect population. This study offers an overview of the aquatic insect fauna discovered in Alibang Eco-Farm and the nearby Alibang Stream. Species data were gathered through long-term Odonata monitoring spanning from 2003 to 2023, as well as a water insect survey conducted in 2023. The findings revealed a total of 136 species belonging to 45 families and 7 orders. Notably, this study marks the first recorded instance of *Peltochares atropiceus* Régimbart, 1903, a species of water scavenger beetle, on the island of Taiwan.

Key words: aquatic insect, Taiwan, new record, Tatun Volcano Group, Subtropics

[研究文章 Research Article]

<https://doi.org/10.5281/zenodo.8373800>

Notes on Hydradeephaga and Hydrophilidae (Insecta: Coleoptera) of the Matsu Islands, including a New Record of *Platynectes dissimilis* (Sharp, 1873) from Taiwan

HSING-CHE LIU^{1,*}, YU-HSIANG HO², HSIN-JU CHENG³, JAROSLAV ŠTASTNÝ³

¹ Diversity Ecological Consultant Ltd., No.37, Rende Rd., Taichung City 413, Taiwan.

² Department of Biology, National Museum of Natural Science, Taichung, 404605, Taiwan.

³ Institute of Ecology and Evolutionary Biology, National Taiwan University, No. 1, Sec. 4, Roosevelt Rd., Taipei 106319, Taiwan.

⁴ Kosmonautů 359, CZ-460 05 Liberec, Czech Republic.

* Corresponding author: td965771@gmail.com

Abstract. This study reviewed the Hydradeephaga and Hydrophilidae of the Matsu Islands in Taiwan. A total of ten species (eight identified species and two unidentified species) from three families were recorded in the Matsu Islands. Among them, *Platynectes dissimilis* (Sharp, 1873) is newly recorded for Taiwan, and four species are newly recorded for the Matsu Islands: *Allodessus megacephalus* (Gschwendtner, 1931), *Dactylosternum* cf. *hydrophiloides* (MacLeay, 1825), *Helochares neglectus* (Hope, 1845), and *Sternolophus rufipes* (Fabricius, 1792). Additionally, based on the photos provided by Wu (2003), we speculate that the Gyrinidae of the Matsu Islands is *Dineutus orientalis* (Modder, 1776).

Keywords: fauna, distribution, aquatic insect, offshore island, taxonomy

Introduction

The Matsu Islands, which belong to Lienchiang County, Taiwan (R.O.C.), comprise eight main islands: Nangan Is., Beigan Is., Gaodeng Is., Liang Is., Dongyin Is., Xiyin Is., Dongyin Is., and Xiyin Is. There are also 28 smaller islands, resulting in a total area of 29.54 km². This island group is in close proximity to southern China, with the nearest distance being only 9 km. However, it is situated 170 km away from the main island of Taiwan.

Following the Chinese Civil War, both the Matsu Islands and the Kinmen Islands became crucial military strongholds for Taiwan from 1949 to 1992, remaining under military control for an extended period. Consequently, there were few entomologists who visited these islands to investigate the insect fauna, especially aquatic insects, which remained largely unknown (Shih et al., 2004). However, noticeable changes began to occur in the 1990s, with the publication of reports on various insect groups, such as mosquitoes, agricultural pests, dragonflies, and butterflies in these regions (Fan & Chang, 1990; Lee, 2000; Fan et al., 2000; Shih et al., 2002; Wu, 2003; Lien, 2004; Hu et al., 2023). The aquatic beetle fauna of the Kinmen Islands has gradually become better known, with eight families identified, including Dytiscidae (23 species), Gyrinidae (1 species), Haliplidae (1 species), Hydraenidae (1 species), Hydrophilidae (15 species), Lampyridae (1 species), Noteridae (1 species), and Scirtidae (1 species) (Fan et al., 2000; Tung et al., 2008; Chang, 2011; 2017; Liu et al., 2021a; Liu et al., 2022). In contrast, research on the aquatic beetle fauna in the Matsu Islands is limited. Currently, only three species have been recorded in the region: *Cybister tripunctatus*, *Eretes griseus* (both Dytiscidae), and an unidentified species of Gyrinidae (Wu, 2003). Therefore, in May 2023, the second and third authors conducted a simple survey on the Matsu Islands, ultimately increasing the known aquatic beetle species to ten.

Materials and methods

The specimens listed in this report were collected using small water nets and light traps. Male genitalia were dissected from water-relaxed specimens and examined on temporary glycerin slides without cover glasses. After examination, the aedeagus was rinsed in 95% alcohol and mounted in Euparal on a small slide below the respective specimen. In some cases of duplicate specimens, the aedeagus was mounted on the same card as the specimen using water-soluble glue. Male genitalia and morphological characters were examined using a Leica DM750 compound microscope.

The materials examined in this paper are deposited at NMNS (National Museum of Natural Science, Taiwan, curated by Mr. Bao-Cheng Lai) and TARI (Taiwan Agricultural Research Institute, Taiwan, curated by Dr. Chi-Feng Lee).

Results

Family Dytiscidae Leach, 1815

龍蝨科

Allodessus megacephalus (Gschwendtner, 1931)

大頭豹斑龍蝨

(Fig. 1A)

Specimens examined. TAIWAN: 1 ex. Lienchiang, Beigan, Banli beach (坂里沙灘), 26.2157, 119.9764, 26-27.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Distribution. Taiwan: Taiwan Island, Penghu Islands, and Lanyu Island, with a new record for the Matsu Islands. This species is also recorded in the following regions: Southern China and Japan (from Honshu to the Ryukyu Islands) (Nilsson, 1995; Liu et al., 2020).

Cybister cf. tripunctatus lateralis (Fabricius, 1798)

點刻三線大龍蝨

Specimens examined. No specimens were examined.

Distribution. Taiwan: Taiwan Island, Kinmen Islands, Matsu Islands, and Penghu Islands (Nilsson et al., 1995; Fan et al., 2000; Wu, 2004; Liu et al., 2020). This species is widely distributed from East Asia to Central Asia (Jiang et al., 2023b).

Remark. This species was previously recorded by Wu (2003), but the specimens were not identified to subspecies. While we were unable to examine specimens from Matsu, both Ohba et al. (2020) and Jiang et al. (2023b) have shown that only *Cybister tripunctatus lateralis* (Fabricius, 1798) occurs in Taiwan and Southern China. Therefore, we assume that the report from the Matsu Islands refers to this subspecies.

Eretes griseus (Fabricius, 1781)

灰色龍蝨

Specimens examined. No specimens were examined.

Distribution. Taiwan: Taiwan Island, Penghu Islands, Matsu Islands, Kinmen Islands, and Lanyu Island (Nilsson et al., 1995; Miwa, 1929; Chang, 1998; Fan et al., 2000; Wu, 2003). This species is widely distributed from East Asia to southern Europe and Africa (Miller, 2002).

Platynectes dissimilis (Sharp, 1873)

暗紋扁形豆龍蝨

(Fig. 1B–C)

Specimens examined. TAIWAN: 1 ♂, 1 ♀. Taiwan, Matsu, Peikan (北竿), 19.VIII.2015, Y.-T. Chung leg. (TARI); 1 ♂, 2 ♀♀. Lienchiang, Beigan, Bishan (壁山), 26.2238, 119.9908, 27.V.2023, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Distribution. Central and southeastern China (Štátný, 2003; Jiang et al., 2023a). This is the first record for Taiwan (Matsu Islands).

Remark. The specimens from the Matsu Islands are very dark in color, resembling *Platynectes chujoi* due to their dark appearance. *Platynectes dissimilis* typically features yellow spots on the elytra in most areas but exhibits a highly variable elytral pattern across its geographic distribution (Jiang et al., 2023a). Upon examination, the specimens of *P. dissimilis* from the Matsu Islands showed longitudinal series of yellow spots that were indistinct or disappearing along the entire length of the elytron, resembling *P. chujoi* in appearance. However, the shape of the median lobe of the aedeagus corresponded to that of the species *P. dissimilis*, distinguishing it from *P. chujoi*. Furthermore, it's worth noting that *P. dissimilis* demonstrates a confirmed high variability in elytral patterns. Consequently, we concluded that this species is either identical to or closely related to *P. dissimilis*. This determination is further supported by the geographical distribution: *P. dissimilis* is common on the mainland and near the Matsu Islands. The natural barrier, the strait between the mainland and the islands, is easier to overcome than the vast distance between Taiwan and the Japanese islands where *P. chujoi* occurs. Additionally, *P. dissimilis* exhibits high morphological variation in elytra patterns, and it is possible that it may later be subdivided into more species through DNA sequence analysis.

Family Gyrinidae Latreille, 1802

豉甲科

Dineutus cf. orientalis (Modder, 1776)

東方圓豉甲

(Fig. 1D)

Specimens examined. No specimens were examined.

Distribution. Taiwan: Taiwan Island and the Matsu Islands (Takizawa, 1931; Wu, 2003). This species is also recorded in China, Korea, Japan, and Russia (Far East) (Lee & Ahn, 2015).

Remark. Wu (2003) reported Gyrinidae from Matsu; however, it was only identified as "Gyrinidae sp." without providing a species identification. Fortunately, the report includes photos (Fig. 1D), which allow us to speculate that this species may be *Dineutus orientalis* (Modder, 1776).



Figure 1. Hydradeephaga of the Matsu Islands. A – *Allodessus megacephalus* (Gschwendtner, 1931), dorsal habitus; B–C – *Platynectes dissimilis* (Sharp, 1873): B – dorsal habitus, C – penis; D – *Dineutus* cf. *orientalis* (Modder, 1776), photo modified from Wu (2003), Photo by Dan Lu.

Family Hydrophilidae Latreille, 1802

牙蟲科

***Dactylosternum* cf. *hydrophiloides* (MacLeay, 1825)**

大點紋牙蟲

(Fig. 2A)

Specimens examined. TAIWAN: 1 ♀. Lienchiang, Beigan, Banli beach (坂里沙灘), 26.2157, 119.9764, 26-27.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Distribution. Taiwan: Taiwan Island, with a new record for the Matsu Islands. This species is also found in Southeast Asia, South Asia, Australia, South Africa, and Jamaica (Mai et al., 2022).

Remark. This species is the only terrestrial species among the Hydrophilidae reported from the Matsu Islands so far.

***Enochrus* sp.**

蒼白牙蟲屬未定種

(Fig. 2B, F)

Specimens examined. TAIWAN: 1 ex. Lienchiang, Nangan, Motianling Trail (摩天嶺步道), 26.1610, 119.9524, 25-26.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS); 2 ♂♂, 3 exs. Lienchiang, Nangan, Siwei (四維路), 26.1731, 119.9172, 25-26.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Remark. This genus probably contains numerous unknown species in East and Southeast Asia, but it is poorly characterized, making species identification difficult. Furthermore, there is still a lack of comprehensive taxonomic reports, which prevents us from identifying it to the species level.

***Helochaeres neglectus* (Hope, 1845)**

密突麗陽牙蟲

(Fig. 2C)

Specimens examined. TAIWAN: 1 ♂, 4 exs. Lienchiang, Nangan, Shengtian Park (勝天公園), 26.1540, 119.9160, 25-26.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Distribution. Taiwan: Taiwan Island and Penghu Islands (Jia, 2005; Liu et al., 2020), with a new record for the Matsu Islands. This species is also known in China, Nepal, and Thailand (Hansen, 1999; Yang et al., 2021).

Helochaeres sp.
麗陽牙蟲屬未定種
(Fig. 2D)

Specimens examined. TAIWAN: 1 ♀. Lienchiang, Nangan, Beigan, Banli beach (坂里沙灘), 26.2157, 119.9764, 26-27.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Remark. This specimen is the only female specimen available. Based on its size and pronotum features, we do not believe it to be *Helochaeres neglectus*. However, species identification within this genus heavily relies on male genitalia, and as a result, we were unable to determine the species.

Sternolophus rufipes (Fabricius, 1792)
姬牙蟲
(Fig. 2E)

Specimens examined. TAIWAN: 2 exs. Lienchiang, Nangan, Motianling Trail (摩天嶺步道), 26.1610, 119.9524, 25-26.V.2023, light trap, Y.-H. Ho & H.-J. Chang leg. (NMNS).

Distribution. Taiwan: Taiwan Island, Lanyu Island, and Kinmen Islands (Liu et al., 2021a, b), with a new record for the Matsu Islands. This species is also known from the following regions: South China, Korea, Japan, Southeast Asia, and South Asia (Nasserzadeh & Komarek, 2017).

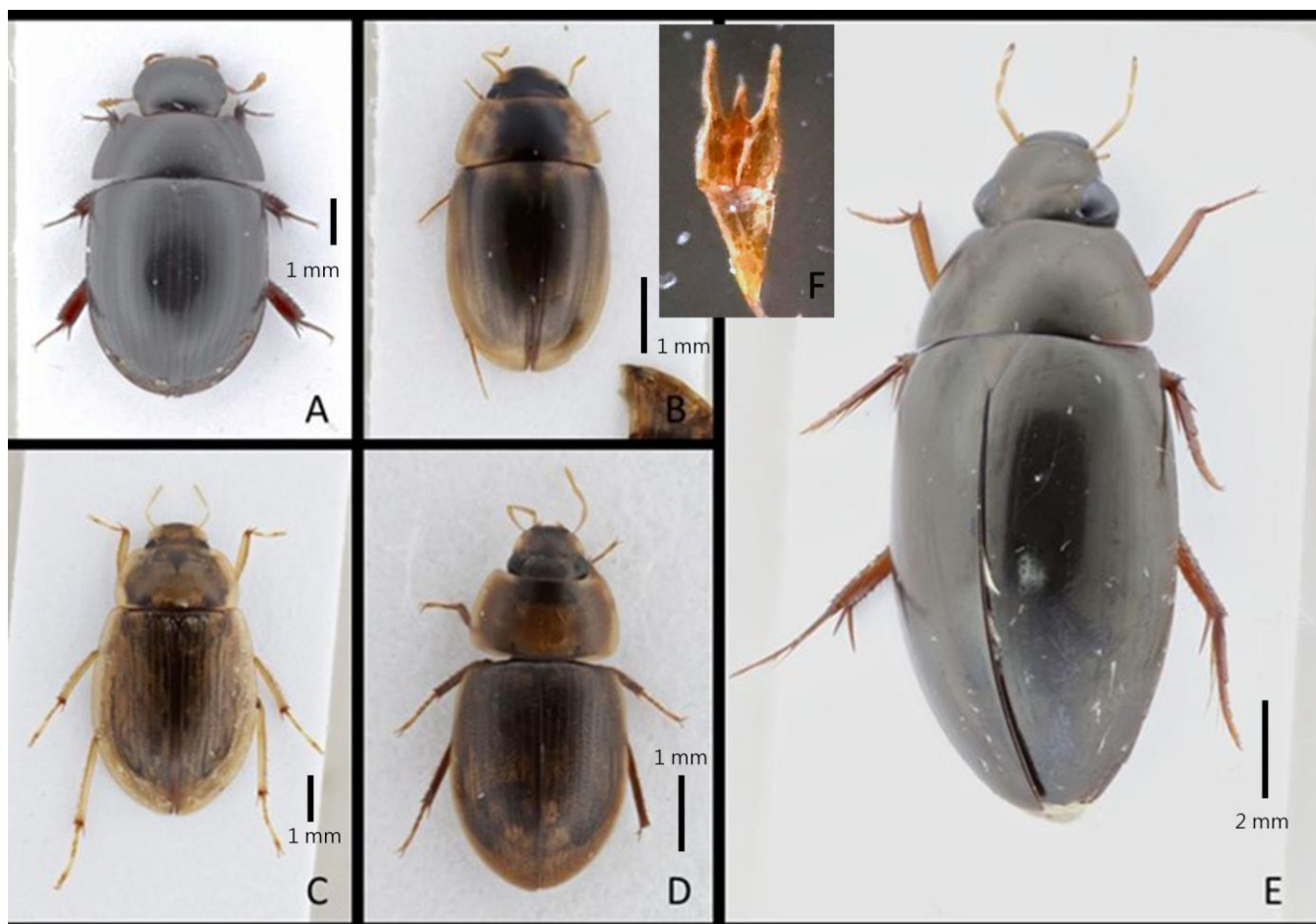


Figure 2. Dorsal habitus and aedeagus of Hydrophilidae from the Matsu Islands. A – *Dactylosternum hydrophiloides* (MacLeay, 1825); B – dorsal habitus of *Enochrus* sp.; C – *Helochaeres neglectus* (Hope, 1845); D – *Helochaeres* sp.; E – *Sternolophus rufipes* (Fabricius, 1792); F – aedeagus of *Enochrus* sp.

Discussion

This report presents the results of a preliminary aquatic beetle survey in the Matsu Islands. The collection of aquatic beetle specimens was quite limited, with only *Platynectes dissimilis* (Sharp, 1873) obtained from water ditches, while the rest were collected using light traps. Unfortunately, we were unable to effectively collect more aquatic beetles, which may have hindered the rediscovery of the three species reported by Wu (2003). In this survey, two species (*Dactylosternum* cf. *hydrophiloides* (MacLeay, 1825) and *Helochares* sp.) could not be definitively identified due to insufficient specimens. Furthermore, it's worth noting that the first author examined the main museum with an insect collection in Taiwan and found that specimens from the Matsu Islands were extremely scarce, in stark contrast to those from Kinmen Islands and Lanyu Islands. This scarcity indicates a serious lack of insect survey and research in Matsu, highlighting the need for further investigation and study in this region.

Acknowledgments

We thank Dr. Chi-Feng Lee (Taiwan Agricultural Research Institute) and Kohei Watanabe (Ishikawa Insect Museum) for providing specimens or photos for the study. We are also grateful to Dr. Chi-Han Chang (Institute of Ecology and Evolutionary Biology, National Taiwan University) for providing funding for the collection, and to Dr. Mei-Ling Chan (Biology Department, National Museum of Natural Science, Taiwan) for providing the photography equipment for this study. Special thanks to Mr. Dan Lu for allowing us to use his photos.

References

- Chang, Y.-J. 1998. Insect Illustrated Book, Yuan-Liou Publish, 368 pp. (in Chinese)
- Chang, Y.-J. 2011. Six-legged elves from golden islands. Administration of Kinmen National Park, Kinmen, Taiwan, 552 pp. (in Chinese)
- Chang, Y.-J. 2017. A Field Guide to the Insects of Lieyu. Administration of Kinmen National Park, Kinmen, Taiwan, 343 pp. (in Chinese)
- Fan, Y.-B. & Chang, Y.-C. 1990. Studies on the Butterflies of Kinmen. *Annual of the National Taiwan Museum* 33: 1–16.
- Fan, Y.-B., Yang, P.-S. & Ho, Y.-M. 2000. Survey on insect fauna of Kinmen Island. *National Park Journal* 10(1): 128–143. (in Chinese)
- Hansen, M. 1999. Hydrophiloidea (s.str.) (Coleoptera), in World Catalogue of Insects, Volume 2. Apollo Books, Stenstrup 416 pp.
- Hu, F.-S., Chen, S.-L., J.-G. He & K.-T. Lin. 2023. *Indothemis carnatica* (Fabricius, 1798) (Odonata: Libellulidae): A Newly Recorded. *Taiwanese Journal of Entomological Studies* 8(1): 16–20.
- Jia, F.-L. 2005. List Hydrophilidae from Taiwan in Hokkaido University of Japan (Coleoptera: Hydrophilidae). Pp. 148–149. In: Ren, G.-D., Zhang, R.-Z. & Shi, F.-M. (eds): Classification and diversity of insect in China. China Agricultural Science and Technology Press, Beijing, 402 pp (in Chinese, English summary).
- Jiang, Z. Y., Zhao, S., Jia, F.-L. & Šťastný, J. 2023a. Two new species of *Platynectes* Régimbart, 1879 from China with notes on other Chinese members of the genus, including a key to species (Coleoptera: Dytiscidae: Agabinae). *Zootaxa* 5227 (4): 401–425.
- Jiang, Z. Y., Zhao, S., Mai, Z. Q., Jia, F. L. & Hendrich, L. 2023b. Review of the genus *Cybister* in China, with description of a new species from Guangdong (Coleoptera: Dytiscidae). *Acta Entomologica Musei Nationalis Pragae* 63(1): 75–102.
- Lee, J.-Y. 2000. Butterflies of Matsu Islands. Lianjiang County Government, Fujian Province, 245 pp. (in Chinese)
- Lee, D.-H. & Ahn, K.-J. 2015. A taxonomic review of the Gyrinidae (Coleoptera) in Korea. *Zookeys* 509: 87–107.
- Lien, J.-C. 1980. Common damselflies and dragonflies of the Quemoy Island (Odonata, Zygoptera, Anisoptera). *Bulletin of the Society of Entomology* 15: 115–126.
- Lien, J.-C. 2004. Key to the family Culicidae in Taiwan. Yi Hsien Publisher, 178 pp. (in Chinese)
- Liu, H.-C. 2020. Review of the Genus *Platynectes* Straneo, 1939 (Coleoptera: Dytiscidae) from Taiwan. *Taiwanese Journal of Entomological Studies* 5(2): 31–35.
- Liu, H.-C., Lin, J. -H. & Zheng, K. -Y. 2020. Notes on Water Beetle (Insecta: Coleoptera) of Penghu Islands, Taiwan. *Taiwanese Journal of Entomological Studies* 5 (4): 49–60. (in Chinese)
- Liu, H.-C., Ma, C. -H. & Fikáček, M. 2021a. Water scavenger beetles of Kinmen County, Taiwan (Coleoptera: Hydrophilidae). *Taiwan Journal of Biodiversity* 23 (1): 39–62.
- Liu, H.-C., Ma, C. -H., Fikáček, M. & Wang, L. -J. 2021b. Annotated catalogue of the water scavenger beetles from Orchid Island, Taiwan (Coleoptera: Hydrophilidae). *Japanese Journal of Systematic Entomology* 27 (2): 301–309.
- Liu, H.-C., Ma, C.-H. & Yoshitomi, H. 2022. First report of the family Scirtidae (Insecta: Coleoptera) from Kinmen Island and Lanyu Island, Taiwan. *Taiwanese Journal of Entomological Studies* 7 (3): 43–45.
- Mai, Z., Hu, J., Minoshima, N. Y., Jia, F.-L. & Fikáček, M. 2022. Review of *Dactylosternum* Wollaston, 1854 from China and Japan. *Zootaxa* 5091(2):269–300.
- Miller, K. B. 2002. Revision of the Genus *Eretes* Laporte, 1833 (Coleoptera: Dytiscidae). *Aquatic Insects* 24(4): 247–272.
- Miwa, Y. 1929. A list of Coleoptera from the Pescadores (Hokoto), collected by Mr. Takahashi in June, 19. *Transactions of the natural history society of Formosa* 19(104): 469–470.
- Nasserzadeh, H. & Komarek, A. 2017. Taxonomic revision of the water scavenger beetle genus *Sternolophus* Solier, 1834 (Coleoptera: Hydrophilidae). *Zootaxa* 4282 (2): 201–254.
- Nilsson, A. N. 1995. Noteridae and Dytiscidae: Annotated check list of the Noteridae and Dytiscidae of China (Coleoptera). Pp. 35–96. In: Jäch, M.A. & Ji, L. (Eds.), Water beetles of China. Vol. I. Zoologisch-Botanische Gesellschaft in Österreich and

- Wiener Coleopterologenverein, Wien, 410 pp.
- Nilsson, A. N., Wewalka, G., Wang, L.-J., & Satô, M. 1995. An annotated list of Dytiscidae (Coleoptera) recorded from Taiwan. *Beiträge zur Entomologie* 45(2): 357–374.
- Ohba, S., Fukui, M., Terazono, Y. & Takada, S. 2020. Effects of temperature on life histories of three endangered Japanese divingbeetle species. *Entomologia Experimentalis et Applicata* 168(11): 808–816.
- Shih, H.-T., Ho, C.-C. & Wu, W.-J. 2002. Chrysomelidae (Insecta: Coleoptera) from Kinmen. *Chinese Journal of Agricultural Research* 51(3): 45–55.
- Shih, H.-T., Ho C.-C., Wu W.-J., Yang J.-T., Tsai M.-Y., Fang S.-J., Yang C.-J., Wang D.-T. & Chou H.-C. 2004. A review and the present status of entomological research in Kinmen Islands and Matsu Islands, Fujian. *Formosan Entomologist Special Publish* 6: 187–210.
- Štátný, J. 2003. Review of *Platynectes* subgen. *Gueorguievtes* Vazirani from Southeast Asia. In: Jäch, M.A. & Ji, L. (Eds.), Water beetles of China. Vol. III. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, Wien, 217–259 pp.
- Takizawa, M. 1931. Gyrinidae of Japan. *Insecta Matsumurana* 6: 13–21.
- Tung, G.-S., Yang, P.-S., Hsu, C.-B., Lin, C.-C. & Lee, C.-F. 2008. A Survey on the Insect Diversity and Inventory of Insect Fauna of Kinmen Islands. Administration of Kinmen National Park, Kinmen, Taiwan. (in Chinese)
- Wu, W.-J. 2003. The insects of Matsu. Lianjiang County Government, 192 pp. (in Chinese)
- Yang, Z., Jia, F., Tang, Y., & Jiang, L. 2021. Two new species of *Helochares*, with additional faunistic records from China (Coleoptera, Hydrophilidae, Acidocerinae). *ZooKeys* 1078: 57–83.

馬祖列島的水棲肉食亞目和牙蟲科註記 (昆蟲綱：鞘翅目)與暗紋扁形豆龍蟲首次記錄於臺灣

劉興哲^{1,*}、賀毓翔²、鄭欣如³、雅羅斯拉夫·斯塔斯尼⁴

¹多樣性生態顧問有限公司 413 臺中市霧峰區仁德巷 12 弄 37 號

²國立自然科學博物館生物學組 臺中市 40453 館前路 1 號

³國立臺灣大學生態學與演化生物學研究所 10617 台北市大安區羅斯福路四段 1 號

⁴ Kosmonautů 359, CZ-460 05 Liberec, 捷克共和國

*通訊作者：td965771@gmail.com

摘要：本研究回顧臺灣馬祖群島的水棲肉食亞目和牙蟲科，共記錄 3 科 10 種 (8 種已知物種與 2 種未定種)。其中暗紋扁形豆龍蟲 (*Platynectes dissimilis* (Sharp, 1873)) 為臺灣新紀錄，以及 4 種為馬祖群島新紀錄：大頭豹斑龍蟲 (*Allodessus megacephalus* (Gschwendtner, 1931))、大點紋牙蟲 (*Dactylosternum* cf. *hydrophiloides* (MacLeay, 1825))、密突麗陽牙蟲 (*Helochares neglectus* (Hope, 1845)) 及姬牙蟲 (*Sternolophus rufipes* (Fabricius, 1792))。另外根據 Wu (2003) 提供的照片，我們推測馬祖的 Gyrinidae sp. 為 *Dineutus orientalis* Modder, 1776。

關鍵詞：動物相、分布、水棲昆蟲、離島、分類學

New Geographic Records of the Flying Fox Bat Fly *Cyclopodia horsfieldi* de Meijere, 1899 (Diptera: Hippoboscoidea) from the Philippines

ACE KEVIN S. AMARGA^{1, 2, 3}, RAINIER MANALO⁴

¹Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan. Email: ace_amarga061@yahoo.com

²School of Life Science, National Taiwan Normal University- Gongguan Campus, Wenshan District, Taipei 11677, Taiwan

³International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group

⁴Crocodylus Porosus Philippines, Inc., Pag-asa Farms, Kapalong, Davao del Norte, Philippines

Abstract. This paper presents new geographic records for the nycteribiid bat fly *Cyclopodia horsfieldi* de Meijere, a widespread Old World endemic species parasitic on flying foxes. Additionally, this account represents the first published record of *C. horsfieldi* on Tawi-Tawi Island and in the Bicol Peninsula (southern Luzon).

Key words: Bicol, flying foxes, Nycteribiidae, Tawi-Tawi

Flying foxes host a unique assemblage of parasitic species. The most common ectoparasitic arthropods found on flying foxes are bat flies and mites, which typically thrive on the pelage and wing membrane of their respective hosts. Endoparasitic helminths also inhabit the internal organs of the host, including the viscera and lungs. Furthermore, flying foxes have been reported to harbor a diverse range of blood-borne parasites and viruses. This paper presents new locality records for *Cyclopodia horsfieldi* de Meijere, a widespread nycteribiid bat fly parasitic on the flying fox genera *Acerodon* Jourdan and *Pteropus* Brisson in the Philippines. Bat fly specimens were collected during various fieldwork surveys conducted across the Philippines. Bat hosts were captured using mist nets placed in different areas within forest ecosystems at study sites. Prior to identification, specimens were preserved in 95% ethanol and examined under a Leica S9D dissecting microscope. Flying fox bat flies were identified following Theodor's (1963) description. Voucher specimens will be deposited at the National Museum of Natural Science in Taichung, Taiwan.

Order Diptera
Family Nycteribiidae
Subfamily Cyclopodiinae

Cyclopodia horsfieldi de Meijere, 1899

Cyclopodia horsfieldi de Meijere, 1899. Tijds. Ent. 42: 153. Type locality: Indonesia (Java).

Material examined. PHILIPPINES: LUZON: ex. *Pteropus vampyrus* (Linnaeus): 1♂ (NMNS 8722-15), 1♀ (NMNS 8722-16), Libmanan municipality (13. 690617N, 122. 978343E), Camarines Sur, V. 2015, coll. H Centeno. (**New locality record, Fig. 1A**) **PALAWAN:** ex. *Pteropus hypomelanus* Temminck: 1♀ (NMNS 8722-17), Ursula Island (8. 342080N, 117. 517113E), Bataraza municipality, 27.VI.2019, coll. R Giganto & A Santillan. **PANAY:** ex. *Pteropus pumilus* Miller: 2♂♂ (NMNS 8722-18, NMNS 8722-19), 1♀, Barangay Jayobo (11. 102763N, 122. 408952E), Lambunao municipality, Iloilo City, coll. AKS Amarga & DAP Fernandez. **CEBU:** ex. *P. hypomelanus*: 1♂, 1♀, Alcoy, 2015, local collector; ex. *P. pumilus*: 2♂♂, Alcoy, 2015, local collector. **TAWI-TAWI:** ex. *P. vampyrus*: 3♂♂ (NMNS 8722-20, NMNS 8722-21, NMNS 8722-22), Barangay Malacca (5. 071837N, 119. 885804E), Panglima Sugala municipality, coll. AKS Amarga. (**New locality record, Fig. 1A**)

Cyclopodia horsfieldi is one of the two species in the genus *Cyclopodia* Kolenati found in the Philippines. This species is widely distributed across Southeast Asia and has been recorded on various species of flying foxes, particularly in the genera *Acerodon* and *Pteropus*. In the Philippines, *C. horsfieldi* is present in all faunal regions and has previously been recorded on the following islands: Luzon, Mindoro, Busuanga, Culion, Palawan, Ursula, Balabac, Panay, Guimaras, Negros, Samar, Leyte, Camiguin, Mindanao, and Jolo (Theodor 1963; Cuy 1980; Amarga & Hastriter 2023a). Recently, Amarga & Hastriter (2023b) reported the presence of *C. horsfieldi* on Cebu Island.

This report represents the first documented occurrence of *C. horsfieldi* on the Bicol Peninsula in southern Luzon. Previous records for this species on Luzon Island were documented by Cuy (1980) in Laguna and Quezon provinces and by Ferris (1925) from an

unspecified *Pteropus* species collected in Bangui, Ilocos Norte. Additionally, this report marks the first record of *C. horsfieldi* on Tawi-Tawi Island and represents the southernmost provincial distribution of *C. horsfieldi* in the Philippine archipelago.

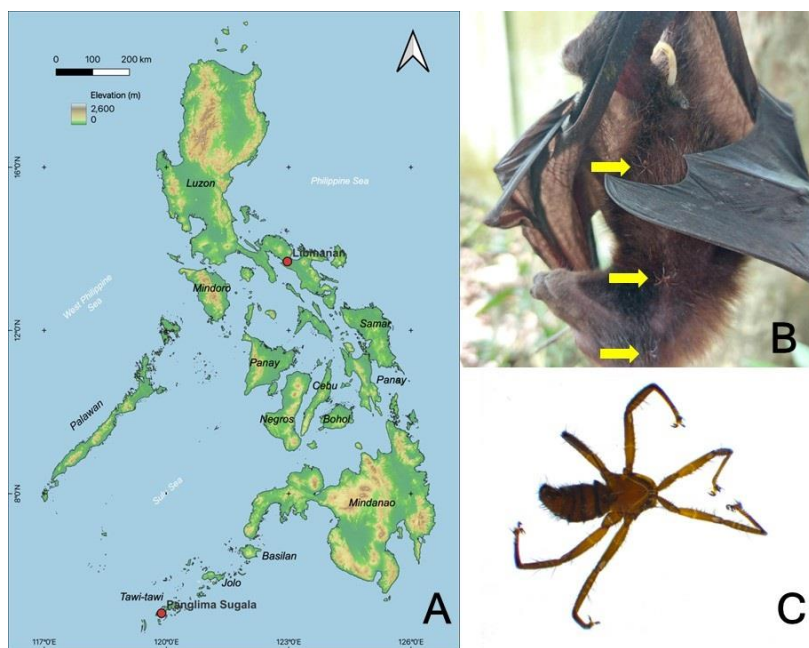


Figure 1. *Cyclopodia horsfieldi* de Meijere and its host *Pteropus vampyrus* (Linnaeus): (A) New locality records (red dots) of *C. horsfieldi* on Luzon and Tawi-Tawi; (B) *C. horsfieldi* foraging on the host pelage, in situ; (C) male *C. horsfieldi* collected from Tawi-Tawi Island (ventral view).

Acknowledgements

The author would like to thank the following individuals: H. Centeno for donating specimens from Bicol; R.A. Ruzol, D.A.P. Fernandez, J.W. Binaday, D. Acuña, and M.J. Sarmiento for their assistance during fieldwork; and C.E. Supsup for creating the locality map (Fig. 1). We also thank BARM-MENRE for providing the collection and transport permit (Wildlife Gratuitous Permit No. 05, Series of 2019).

References

- Amarga, A. K. S. & Hastriter, M. W. 2023a. First record of the flying fox bat fly *Cyclopodia horsfieldi* de Meijere, 1899 (Diptera: Hippoboscoidea: Nycteribiidae) on Ursula Island, Philippines. *Historia naturalis bulgarica* 45 (2): 25–29.
- Amarga, A. K. S. & Hastriter, M. W. 2023b. Bat flies (Diptera: Hippoboscoidea) associated with fruit bats (Pteropodidae) on Cebu Island, Philippines. *Taiwanese Journal of Entomological Studies* 8 (1): 8–11.
- Cuy, L. S. 1980. Nycteribiidae (Diptera) of the Philippines. *Kalikasan, Philippine Journal of Biology* 9 (2–3): 145–168.
- de Meijere, J. C. H. 1899. *Cyclopodia horsfieldi* n.sp., eine neue Nycteribie aus Java. *Tijdschrift voor Entomologie* 42: 153.
- Ferris, G. F. 1925. Third report upon Diptera Pupipara from the Philippine Islands. *Philippine Journal of Science* 27: 413–421.
- Theodor, O. 1963. Philippine batflies of the family Nycteribiidae. *Fieldiana Zoology* 42 (11): 151–192.

Cyclopodia horsfieldi de Meijere, 1899 (雙翅目：蟲蠅總科) 之菲律賓新地理紀錄

艾斯^{1,2,3}、雷尼爾·馬納洛⁴

¹ 中央研究院生物多樣性中心 生物多樣性臺灣國際研究生博士學位學程 11529 臺北市南港區

E-mail: ace_amarga061@yahoo.com

² 國立臺灣師範大學生命科學專業學院 11677 臺北市文山區

³ 國際自然保護聯盟物種存續委員 (IUCN SSC) 寄生蟲專家組

⁴ Crocodylus Porosus Philippines, Inc. , Pag-asa 農場 卡帕隆 北達沃省 菲律賓

摘要：本文介紹了廣泛分佈於古北界的狐蝠寄生物種 *Cyclopodia horsfieldi* de Meijere, 1899 的新地理紀錄。此外，這筆紀錄也代表了本種在 塔威塔威島以及 比科爾半島(呂宋島南部) 的首次報導。

關鍵字：比科爾、狐蝠、蛛蠅科、塔威塔威

Formal Record of *Mecopus hopei* Rosenschöld, 1838 (Curculionidae: Conoderinae) in Taiwan

WEI-ZHE TSENG^{1, 2}, REN-CHUNG CHENG^{2, 3}

¹ Department of Life Science, National Taiwan Normal University, No. 88, Sec. 4, Tingzhou Rd., Taipei City 116059, Taiwan. E-mail: jay584371@gmail.com

² Department of Life Sciences, National Chung Hsing University

³ Research Center for Global Change Biology, National Chung Hsing University
No. 145 Xingda Rd., South Dist., Taichung 40227, Taiwan.

Abstract: *Mecopus hopei* Rosenschöld, 1838 is a common species in Taiwan. However, it has been frequently misspelled in Taiwanese records, leading to its omission from regional catalogs. In this study, we formally record *M. hopei* in Taiwan and provide dorsal habitus photos and barcode sequences to improve species identification.

Keywords: Mecopini, jackfruit bud weevil, pest, DNA barcode

The first record of *Mecopus hopei* Rosenschöld, 1838 in Taiwan dates back to a 1999 report by the Taitung District Agricultural Improvement Station (1999). This report mentioned the species as a jackfruit pest but lacked details and misspelled its name. This misspelling became widely used in pest management research (e.g., Hsien, 2001), resulting in its exclusion from the Palaearctic Coleoptera catalogue (Alonso-Zarazaga et al., 2017; Shao, 2020). This study formally documents *M. hopei* in Taiwan, providing dorsal habitus photos from the holotype and Taiwanese population, along with barcode sequences to aid species identification.

Specimens were examined and photographed using an SMZ 800D stereomicroscope with SGviews software (Sage Vision CO., Ltd., Taiwan). Cytochrome c oxidase subunit I (barcode region) sequences were amplified following Tseng & Cheng (2021) method. Deposits of the specimens can be found at the National Museum of Natural Science, Taichung, Taiwan (NMNS), and the Oxford University Museum of Natural History (OUMNH).

Mecopus hopei Rosenschöld, 1838

霍氏大眼象鼻蟲、波羅蜜象鼻蟲

(Figure 1)

Type material examined. Holotype: 1♂, “blank” [black rectangular label] / Hope [black rectangular label] / Bengal [white rectangular label] / *Mecopus hopei* [white rectangular label] / COL: 1492 (OUMNH).

Material examined. TAIWAN: 2♂♂, Taipei Municipal Chung-Cheng Senior High School (臺北市立中正高中), Shilin District, Taipei City, 8. III. 2020, W.-Z. Tseng leg. // WZPCC_01980 – WZPCC_01981 (NMNS); 1♂1♀, Taichung Municipal Chang-Yi Senior High School (臺中市立長億高中), Taiping District, Taichung City, N24.11373 E120.72119, 22. XI. 2021, P.-S. Lee & W.-Z. Tseng leg. // WZPCC_03633 – WZPCC_03634 (NMNS).

GenBank accession number. WZPCC_01980: OR515184; WZPCC_01981: OR515231; WZPCC_03633: OR515230; WZPCC_03634: OR515229

Remarks. This species is a major pest of *Artocarpus heterophyllus* Lam. in Taiwan (Taitung District Agricultural Improvement Station, 1999; Hsien, 2001). It is also found on the trunks of *Ficus microcarpa* L.f. and *Bombax ceiba* L. However, its scientific name is often misspelled as 'Mecopus nose' in Taiwanese records (e.g., Hsien, 2001).

The authors acknowledge the Genomics Center for Clinical and Biotechnological Applications of the National Core Facility for Biopharmaceuticals, Taiwan (MOST 109-2740-B-010-002), Dr. Amoret Spooner (OUMNH) for providing detailed photos of

the holotype specimen, Mr. Pei-Shiuan Li for fieldwork assistance, and the valuable comments of the reviewers and the proofreading by the TJES English editor.

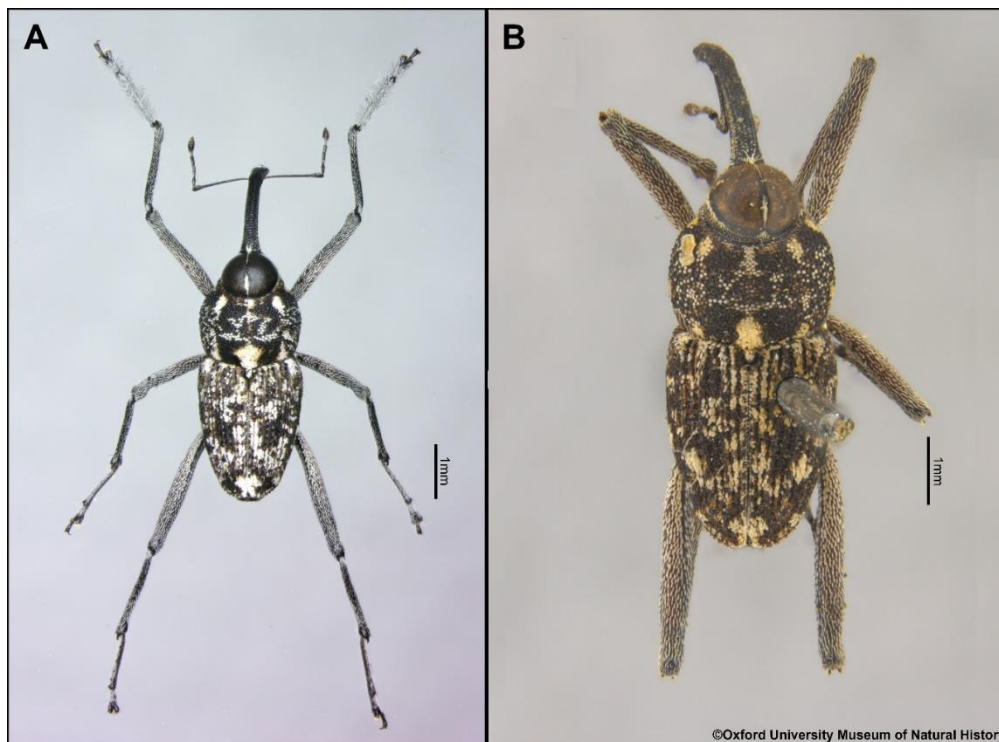


Figure 1. Dorsal habitus of *Mecopus hopei* Rosenschöld, 1838. A: Taiwanese population, B: holotype.

References

- Alonso-Zarazaga, M. A., Barrios, H., Borovec, R., Bouchard, P., Caldara, R., Colonnelli, E., Gültekin, L., Hlaváč, P., Korotyaev, B., Lyal, C. H. C., Machado, A., Meregalli, M., Pierotti, H., Ren, L., Sánchez-Ruiz, M., Sforzi, A., Silfverberg, H., Skuhrovec, J., Trýzna, M., Velázquez de Castro, A. J., & Yunakov, N. N. 2017. Cooperative Catalogue of Palaearctic Coleoptera Curculionoidea. Sociedad Entomológica Aragonesa (eds). Monografías electrónicas SEA 8, Zaragoza, Spain. 729 pp.
- Hsien, C.-L. 2001. Occurrence and integrative management of jack fruit weevil. *Bulletin of Taitung District Agricultural Improvement Station* 38: 9–12. (in Chinese)
- Shao, K.-T. 2020. Catalogue of life in Taiwan. Web electronic publication. version 2020. Available at <http://taibnet.sinica.edu.tw> (accessed 29 December 2022).
- Taitung District Agricultural Improvement Station. 1999. Annual Report (1998). Taitung District Agricultural Improvement Station, Taitung, Taiwan. 118 pp. (in Chinese)
- Tseng, W.-Z. & Cheng R.-C. 2021. First record of genus *Phaeopholus* Roelofs, 1873 (Coleoptera: Curculionidae: Hyperinae) in Taiwan. *Taiwanese Journal of Entomological Studies* 6 (2): 6–12.

臺灣產霍氏大眼象鼻蟲之正式紀錄（象鼻蟲科：大眼象鼻蟲亞科）

曾偉哲^{1,2}、鄭任鈞^{2,3}

¹國立臺灣師範大學生命科學系 80424 臺北市文山區汀洲路四段 88 號

²國立中興大學生命科學系

³國立中興大學生命科學院全球變遷生物學研究中心 40227 臺中市南區興大路145號

摘要：霍氏大眼象鼻蟲是臺灣的常見物種，然而臺灣的紀錄經常錯誤拼寫本種的學名，以至於古北界鞘翅目名錄並未收錄本種臺灣的分布紀錄。本文提供臺灣產霍氏大眼象鼻蟲的正式紀錄，並附上標本背面照與生命條碼序列以利物種鑑定。

關鍵字：大眼象鼻蟲族、波羅蜜象鼻蟲、害蟲、生命條碼

Record of *Tramea virginia* (Rambur, 1842) (Odonata: Libellulidae) from the West Pacific Ocean

FANG-SHUO HU¹

¹ Dragonfly Association of Taiwan, 2F., No. 5, Long'an Rd., Xinzhuang Dist., New Taipei City 242046, Taiwan.

E-mail: fangshuo_hu@mail.nchu.edu.tw

Abstract: This paper provides a photo of a male *Tramea virginia* (Rambur, 1842) taken from the West Pacific Ocean, approximately 30 km east of the nearest land. This photo serves as a migration record, and the paper also briefly discusses the migration behavior of the genus *Tramea* Hagen, 1861.

Key words: Migration, Oriental region, dragonfly, Anisoptera

Dragonflies are renowned for their remarkable transoceanic migrations, a phenomenon observed on a global scale (May 2013), including recent reports from Taiwan (Ma et al. 2022, Hu et al. 2023). The genus *Tramea* is known for its excellent migratory abilities, attributed to its notably expanded hindwings that enhance gliding (May 2013). Migration records of several species of *Tramea* have been reported (e.g., Dumont 1977, Soltesz 1992, May 2013, Futahashi & Kita 2019, Ozono et al. 2022). Two *Tramea* species are found in Taiwan: *Tramea virginia* (Rambur, 1842) and *T. transmarina* Brauer, 1867. Both species have migration records in Japan (Futahashi & Kita 2019, Ozono et al. 2022). However, there are no such records of this genus in Taiwan.



Figure 1. The male individual of *Tramea virginia* observed in this paper. The red star indicates the observation site.

On April 10, 2023, a dragonfly was discovered and photographed flying above the sea surface from a birdwatching boat in the West Pacific Ocean near the east coast of Taiwan on a sunny day. The dragonfly briefly appeared around 10 am and disappeared after 30 seconds, seemingly during migration. The locality where the dragonfly was observed is approximately 30 km east of Nanao Township, Yilan County, Taiwan (24.423, 122.027). Upon examining the pictures, the author confidently identified it as *T. virginia*, primarily based on the distinctive broad dark patch with a paler brown interior on the anal region of the hindwings. The migration direction of the observed dragonfly is unknown.

Based on the record, there is a possibility of a migrated population of *T. virginia* in Taiwan. However, detecting this potential population is challenging due to the species' common and widespread presence throughout the entire island and its surrounding smaller islands. In addition to *T. virginia* and *T. transmarina*, Ozono et al. (2022) have also listed *T. loewii* Kaup, 1866, and *T. basilaris* (Palisot de Beauvois, 1805) as migratory species in Japan. Given that both of these species have extensive distributions in Southeast Asia, there is significant potential for them to have also migrated to Taiwan.

The photo was taken using a Canon EOS R5 camera with an RF100-500mm f/4.5-7.1L IS USM lens, and the map was created using SimpleMappr (Shorthouse 2010). The author extends his gratitude to Jeran Lin (Yilan County, Taiwan) for coordinating the field trip.

References

- Dumont, H. J. 1977. On migrations of *Hemianax ephippiger* (Burmeister) and *Tamea basilaris* (P. de Beauvois) in West and North-West Africa in the winter of 1975/1976 (Anisoptera: Aeshnidae, Libellulidae). *Odonatologica* 6 (1): 13–17.
- Hu, F.-S., Chen, S.-L., He, J.-G. & Lin, K.-T. 2023. *Indothemis carnatica* (Fabricius, 1798) (Odonata: Libellulidae): A newly recorded dragonfly from Kinmen Islands and Matsu Islands, Taiwan. *Taiwanese Journal of Entomological Studies* 8 (1): 16–20.
- Ma, C.-H., Chen, S.-L., Lou, C.-M., Lee, I.-L., Hu, F.-S. 2022. The genus *Sympetrum* Newman, 1833 (Odonata: Libellulidae) in Taiwan: distribution, bionomics and a report of a newly recorded species. *Taiwanese Journal of Entomological Studies* 7 (3): 27–42.
- May, M. L. 2013. A critical overview of progress in studies of migration of dragonflies (Odonata: Anisoptera), with emphasis on North America. *Journal of Insect Conservation* 17: 1–15.
- Ozono, A., Kawashima, I. & Futahashi, R. 2022. Dragonflies of Japan, Revised 2nd edition. Bunichi-Sogo Syuppan., Co. Ltd., Tokyo, Japan, 532 pp. (in Japanese)
- Futahashi, R. & Kita, H. 2019. Migration record of *Tamea virginia* (Rambur, 1842) (Odonata, Libellulidae) in Tsukuba City, Ibaraki Prefecture, Japan. *Bulletin of Ibaraki Nature Museum* 22: 29–30. (in Japanese)
- Shorthouse, D. V. 2010. SimpleMappr, an online tool to produce publication-quality point maps. Available from <https://www.simplemappr.net>. (Accessed 07 September 2023)
- Soltész, K. 1992. An invasion of *Tamea calverti* on the Northeast coast. *Argia* 4 (3):9–10.

大華蜻蜓（蜻蜓目：蜻蜓科）來自西太平洋上的紀錄

胡芳碩¹

¹臺灣蜻蜓學會 242046 新北市新莊區龍安路5號2樓

E-mail: fangshuo_hu@smail.nchu.edu.tw

摘要: 本文提供拍攝自西太平洋的大華蜻蜓 (*Tamea virginia*) 雄蟲照片，該處距離最近的陸地約 30 公里，此紀錄被認為是遷移中的大華蜻蜓，文中亦簡短討論斜痣蜻屬 (*Tamea*) 的遷移行為。

關鍵字: 遷移、東方區、蜻蜓、差翅下目

First Record of *Amblyomma helvolum* Koch (Ixodidae: Amblyomminae) Parasitism on *Diploderma swinhonis* (Günther) (Agamidae: Draconinae) on the Main Island of Taiwan

ACE KEVIN S. AMARGA^{1, 2, 3}, TZONG-HAN LIN²

¹Biodiversity Program, Taiwan International Graduate Program, Biodiversity Research Center, Academia Sinica, Nangang District, Taipei 11529, Taiwan. Email: ace_amarga061@yahoo.com

²School of Life Science, National Taiwan Normal University- Gongguan Campus, Wenshan District, Taipei 11677, Taiwan

³International Union for Conservation of Nature Species Survival Commission (IUCN SSC) Parasite Specialist Group

Abstract. This article presents the first recorded instance of the reptile tick *Amblyomma helvolum* infesting Swinhoe's Japalure (*Diploderma swinhonis*) on the main island of Taiwan. Prior to this, the only published record of *A. helvolum* infestation on *D. swinhonis* was from Orchid Island.

Key words: ectoparasite, Ixodidae, new island record, Squamata.

Diploderma swinhonis (Günther) (Swinhoe's japalure), commonly known as Swinhoe's Japalure, is an endemic lizard species native to Taiwan and its adjacent islands, such as Orchid Island and Green Island (Ota 1991). Originally described in the genus *Japalura*, it was subsequently reclassified under the genus *Diploderma* (Wang et al. 2019). This diurnal species has a wide distribution, primarily found at elevations below 1,500 meters, spanning various habitat types (Ota 1991). Its diet primarily consists of small invertebrates (Norval et al. 1991). Additionally, *D. swinhonis* has been identified as a host for several parasitic invertebrate groups, including Ixodida, Nematoda, and Pentastomida (Norval et al. 2014; Amarga et al. 2023).

On July 13, 2023, an adult *D. swinhonis* was collected from Bitan (24°57'14.8" N, 121°31'59.0" E), Xindian District, New Taipei City, Taiwan. An engorged tick larva was found on the lizard's lateral torso (Fig. 1A) and was preserved in 95% ethanol. This larva was identified as *Amblyomma helvolum* Koch (Ixodida: Ixodidae: Amblyomminae) based on Kawk et al. (2023) (Fig. 1B). The species is widely distributed in the Oriental and Australasian regions and has been recorded in multiple countries, including Indonesia, Laos, Malaysia, the Philippines, Singapore, Taiwan, Timor Leste, and Vietnam (Robbins 2005; Petney et al. 2019; Amarga et al. 2022; Oda et al. 2022; Kwak et al. 2023). It primarily parasitizes Squamata but has been found on mammals and testudines in rare cases (Guglielmone et al. 2020; Oda et al. 2022). The Taiwanese records on reptiles were summarized in Amarga et al. (2023). The first documentation of *A. helvolum* parasitizing *D. swinhonis* was in 2021 on Orchid Island, southeast of Taiwan (Amarga et al. 2023). In addition, we hypothesize that *A. helvolum* may also infest other *Diploderma* species that coexist with *D. swinhonis* such as *D. brevipes* (Gressitt) and *D. polygonatum* Hallowell.

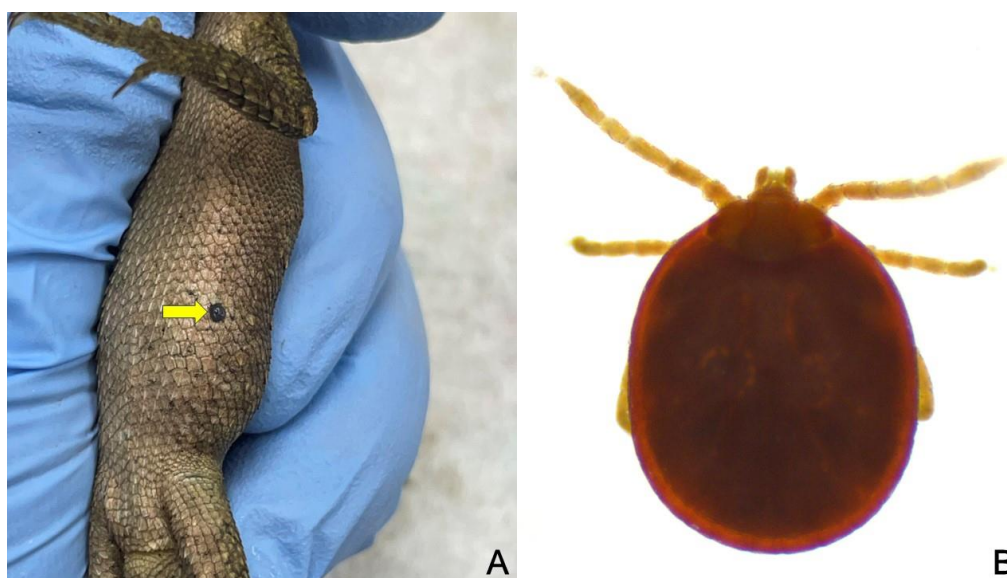


Figure 1. *Amblyomma helvolum* larva on *Diploderma swinhonis*: (A) attachment site on the lower torso (yellow arrow); (B) dorsal habitus of the specimen.

Acknowledgements

The authors would like to thank Dr. Hui-Yun Tseng (National Taiwan University) for providing laboratory space.

References

- Amarga, A. K. S., Lin, J.-W., Tseng, H.-Y., Robbins, R.G., Kwak, M. L. & Lin, S.-M. 2023. New host records of the reptile tick *Amblyomma helvolum* Koch (Ixodida: Ixodidae: Amblyomminae) in Taiwan. *Systematic & Applied Acarology* 28(5): 931–943.
- Amarga, A. K. S., Gestia, G. A. & Cuevas, C. B. 2022. New locality record for the reptile tick *Amblyomma helvolum* Koch, 1844 (Acari: Ixodidae) on the Bicol Peninsula, Luzon Island, Philippines. *Thailand Natural History Museum Journal* 14(2): 87–91.
- Guglielmone, A. A., Petney, T. N. & Robbins, R. G. 2020. Ixodidae (Acari: Ixodoidea): descriptions and redescriptions of all known species from 1758 to December 31, 2019. *Zootaxa* 4871(1): 1–322.
- Kwak, M.L., Jones, M. D., Harman, M. E. A., Smith, S. N., D'souza, A., Knierim, T., Barnes, C. H., Waengsothorn, S., Amarga, A. K. S., Kuo, C.-C. & Nakao, R. 2023. The East Indies reptile tick *Amblyomma helvolum* Koch, 1844 (Acari: Ixodidae), taxonomy, biology and new host records, including the first record of human infestation. *Tick and Tick-borne Diseases* 14(6): 102224.
- Oda, F. H., Martins, T. F., Labruna, M. B., O'Shea, M. & Kaiser, H. 2022. Ticks (Acari: Ixodidae) of three Timor-Leste reptiles: first country of *Amblyomma helvolum*, with new interactions and an updated list of host species. *Ticks and Tick-borne Diseases* 14(2): 102060.
- Ota, H. 1991. Taxonomic redefinition of *Japalura swinhonis* Günther (Agamidae: Squamata), with a description of a new subspecies of *J. polygonate* from Taiwan. *Herpetologica* 47: 280–294.
- Norval, G., Huang, S.-C., Mao, J.-J., Goldberg, S. R. & Slater, K. 2012. Additional notes on the diet of *Japalura swinhonis* (Agamidae) from southwestern Taiwan, with comments about its dietary overlap with the sympatric *Anolis sagrei* (Polychrotidae). *Basic and Applied Herpetology* 26: 87–97.
- Norval, G., Goldberg, S. R., Bursey, C. R., Mao, J.-J. & Slater, K. 2014. Internal parasites of lizards from Taiwan. *Herpetological Conservation and Biology* 9(3): 484–494.
- Petney, T. N., Saijuntha, W., Boulanger, N., Chitimia-Dobler, L., Pfeffer, M., Eamudomkarn, C., Andrews, R. H., Ahamad, M., Putthasorn, N., Muters, S. V., Petney, D.A., Robbins, R. G. 2019. Ticks (Argasidae, Ixodidae) and tick-borne diseases of continental Southeast Asia. *Zootaxa* 4558(1): 1–89.
- Robbins, R.G. 2005. The ticks (Acari: Ixodida: Argasidae, Ixodidae) of Taiwan: A synonymic checklist. *Proceedings of the Entomological Society of Washington* 107(2): 245–253.
- Wang, K., Che, J., Lin, S.-M., Deepak, V., Aniruddha, D.-R., Jiang, K., Jin, J., Chen, H. & Siler, C.D. 2019. Multilocus phylogeny and revised classification for mountain dragons of the genus *Japalura* s.l. (Reptilia: Agamidae: Draconinae) from Asia. *Zoological Journal of the Linnean Society* 185(1): 246–267.

臺灣本島首次記錄南蛇花蜱（硬蜱科：花蜱亞科）寄生於斯文豪氏攀蜥（飛蜥科：飛蜥亞科）

艾斯^{1,2,3}、林宗翰²

¹中央研究院生物多樣性中心 生物多樣性臺灣國際研究生博士學位學程 11529 臺北市南港區

E-mail: ace_amarga061@yahoo.com

²國立臺灣師範大學生命科學專業學院 11677 臺北市文山區

³國際自然保護聯盟物種存續委員會（IUCN SSC）寄生蟲專家組

摘要：本文報導臺灣本島的南蛇花蜱 (*Amblyomma helvolum*) 寄生於斯文豪氏攀蜥 (*Diploderma swinhonis*) 的首次紀錄。在本文發表之前，臺灣唯一的南蛇花蜱寄生於斯文豪氏攀蜥的紀錄來自蘭嶼。

關鍵字：體表寄生生物、硬蜱科、島嶼新紀錄、有鱗目

臺灣研蟲誌

Taiwanese Journal of Entomological Studies

主編 (Editor In Chief)：劉興哲 (Hsing-Che LIU)

副主編 (Associate Editor)：胡芳碩 (Fang-Shuo HU)、曾偉哲 (Wei-Zhe TSENG)

編輯群 (Editorial Board)：謝侑廷 (You-Ting HSIEH)、林偉爵 (Wei-Chueh Lin)、蕭昀 (Yun Hsiao)

發行人 (Publisher)：黃嘉龍 (Chia-Lung Huang)

地址 (Address)：高雄市大樹區中山路 172 號

網站 (Website)：http://taisocinh.wixsite.com/taisocinsectnhweb

出版年月 (Date of publication)：西元 2023 年 9 月 25 日

創刊年月 (First date of publication)：西元 2016 年 12 月 25 日

刊期頻率 (Frequency)：季刊

臺灣昆蟲同好會

Taiwanese Society of Insect Natural History

本會為臺灣昆蟲(含蛛形)愛好者所組成，廣納研究同好為會友，以定期與不定期方式舉辦各種研討聚會、發行昆蟲(含蛛形)自然史相關觀察研究期刊，凝聚全臺愛好者，以促進我國昆蟲、蛛形自然史之發展。

本會對本會誌文章著作內容持有版權 ©臺灣昆蟲同好會。版權所有
Copyright © Taiwanese Society of Insect Natural History All rights reserved

「臺灣研蟲誌」(Taiwanese Journal of Entomological Studies) 係臺灣昆蟲同好會正式出版的刊物，每年出版一卷四期，於三月、六月、九月及十二月各出一期，歡迎踴躍投稿，但以未曾刊載於其他刊物者為限。凡有關昆蟲或蛛形綱的自然史相關如野外生態行為、區域物種相調查、飼養記錄、形態觀察描述，以英文或繁體中文撰寫，皆在歡迎之列。

來稿請寄送：taisocinh@gmail.com